EVALUATION OF THE IMPACT OF HEALTH CARE ON ACTIVITY LEVELS OF THE RURAL POOR

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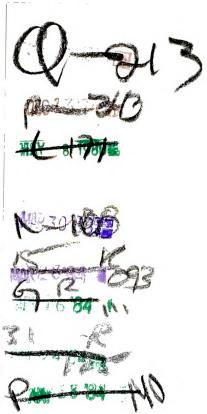

ABSTRACT

EVALUATION OF THE IMPACT OF HEALTH CARE ON
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By

Werner Kiene

Federal and state agencies have been experimenting with alternative institutional arrangements in solving the American "health crisis." Yet, so far very little is known about the impact of programs on the health of the target populations. As in other areas of public spending, health project administrators have a fairly good idea of what they put into their programs but lack information on the socially relevant and desired outputs. Most of the output measures used indicate how efficient an organization is in providing "units" of care, yet they do not tell how efficient those services are in producing health.

This thesis attempts to provide some insight into the problem of output identification and measurement of public projects in general and of health projects in particular. The concepts of "Derived Demand" and the "New Theory of Consumer Demand" are applied in developing a framework for identifying relevant input-output relationships. This framework emphasizes a treatment of attributes rather than concentrating solely on the physically observable units.

The application of the conceptual guidelines to the evaluation of health services results in the definition of

health status in terms of its attributes, i.e., "enhancing role fulfillment" and "reducing deviation from ideal roles." Relevant roles are identified as the ability to play, go to school, go to work, and work at home. (The study suggests ways to group health services inputs according to attributes. However, these concepts are not pursued in further detail.)

Questions of the National Health Survey Interview were utilized in organizing a survey instrument on health status outcomes (role fulfillment and deviation from ideal roles). Problems on establishing health related questionnaires, designs, and interviewing are discussed in light of the experience gained in this research.

The concepts developed in this study were applied to the evaluation of a rural health project located in Northern Michigan. (The Western Michigan Comprehensive Health Service Project with its main clinic in Baldwin (Lake County) serves people in an area consisting of the four counties of Lake, Mason, Manistee and Newaygo.)

Resource constraints limited the analysis to an investigation of Lake County. One part of the empirical analysis consisted of a survey on role fulfillment of all age groups while the other utilized attendance records collected by the school system in the project area.

The procedure which utilized a survey instrument was conducted in the format of an "ad hoc comparison" with a comparison county that resembles the treatment county (Lake)

in all variables except the availability of health services. Socio-economic data supported the assumption that Montmorency County, Michigan, met the requirements of a comparison county. The survey results indicated that the project could reduce days lost from play, school attendance and home work but not from work. The examination of school attendance records did not produce sufficient evidence to establish the impact of the health project.

Despite the inconclusive results of the empirical analysis, it could be shown that the developed conceptual framework is a useful guideline in conducting an output-oriented project evaluation. Detailed recommendations for additional investigations were reported to facilitate future research on health project evaluation.

EVALUATION OF THE IMPACT OF HEALTH CARE ON ACTIVITY LEVELS OF THE RURAL POOR

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Werner Kiene

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To Heidi

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CHAPTER I

INTRODUCTION

Officials at various levels of government feel increasing pressure to report what they actually produce with funds under their administration. Based on economic and organizational theory, the principles of Planning-Programming-Budgeting Systems (PPBS) have been advanced to aid the decision maker in his complicated task.

Most of the literature published in the PPBS field concentrates on 1) the need for reorganized thinking in government, 2) systems problems and 3) refinement of Benefit-Cost analysis. The majority of discussions start out with the assumptions that there is an identifiable and measurable set of inputs and outputs and proceed from there to advance systems and interaction models and discounting procedures. All these models and thoughts are very appealing to those who are aware of the complex systems nature of the public sector and of how this sector is constantly being accused of "overspending," "duplicating and counteracting its efforts" and "underserving the needs of those to be served."

Federal agencies were the first to move toward PPBS as a basis for "rational" spending. Experiments at the Federal level were soon followed by applying PPB thinking to state and local governments. For instance, the state of Michigan

begun in 1971 to implement a PPB system called Program Budget Evaluation System (PBES). In Michigan, like in many other instances, much organizing and "systemizing" has been completed, and what remains to be done is to "fill in the numbers." It is here where the problems of agency heads, division chiefs, and their middle level staff begin. The problem of identification: What is their organization's output? The problem of classification: How can this output be grouped into relevant units? The problem of measurement: How can the output be measured? The problem of data collection: How can the information be collected?

There is very little organized knowledge upon which those who need information could fall back on. Experience from one area of application is seldomly transferred to another. Exchange is sometimes impossible even within departments due to "language" barriers. Is it possible to form a body of knowledge which would give guidelines to those who have to "sweat it out" i.e. to those who generate the information in the system?

This dissertation constitutes an effort of providing such a methodology or guidelines. It grew out of the author's attempts to describe and evaluate the social infrastructure of rural communities by means of a computer simulation and by using the PPB framework. The modeling of such a system seemed to be feasible and promised to show results of heuristic value. Yet, the reliance on non-existent output indicators made such a model of little use to the actual decision makers. Once it became apparent through a review of

the literature and through initial research efforts that the real bottleneck in evaluating public expenditures is the classification and measurement of output, subsequent research efforts were focused on these issues.

A rural community Health Center in northwestern Michigan was chosen as a case study for such an investigation. The choice of this particular case was based on several considerations:

i) Previous contacts between the Health Center and Michigan State University. (Staff members of the College of Human Medicine were involved in planning the Health Center.)

ii) Previous research experience of the Department of Agricultural Economics at MSU in the area of rural health care (Sarkar[1], Doherty[2]).

iii) The increasing importance of the variables "health" and "health care" in the welfare function of individuals and communities. (The achievement and maintenance of a high status of physical and mental well-being has been proclaimed as one of the foremost goals of our society.)[3]

iv) The significant increase of monetary inputs in the project area. The Lake County area was served by two aging doctors before the Health Center was established in 1967. The Health Center's annual budget between 1968 and 1972 varied between $2.02 million and $3.15 million.[4]

Point 4 was probably the most important consideration for concentrating on this particular project. It was felt that since the measurement of output was severely limited by a lack of previous experience, it would be most promising to try to expose events in a situation of extremely increased inputs.

1. Objectives

The objectives of this study are:

i) To develop a theoretical framework for analyzing the input-output relationship of public investment.

ii) To apply this framework to the analysis of investment in health care facilities.

iii) To demonstrate the procedure of a health project evaluation using a case study.

iv) To produce substantive measures of health care impact on human activity levels.

v) To use the collected experience in proposing a plan for a more elaborate and methodologically more advanced evaluation of investment in health care.

The objectives indicate that the major emphasis of this study is on developing a methodology for identifying and measuring input-output relationships of public projects. The study is divided into a general methodology of public project evaluation, a specific methodology for health project evaluation and an empirical treatment of health services evaluation.

2. Organization of Study

Chapter II shows that economic theories can be employed to establish a relevant perspective for the evaluation of a public investment process. The theories are rooted in neo-classical economic thinking commonly referred to as micro-economics. The "New Theory of Consumer Demand" and the concept of "derived demand" are suggested as a guideline for organizing and identifying relevant variables. Dynamic properties are introduced by outlining a systems design as the basic framework for modeling.

Chapter III focuses on the problem area of evaluating investment in health care. Here, the general ideas of project evaluation as introduced in Chapter II are specifically applied to the health field. New theoretical developments to cope with the peculiarities of the commodities "health" and "health services" are highlighted. The chapter proceeds to summarize past efforts to analyze and evaluate health programs and projects. These efforts consist basically of epidemiological, cost-effectiveness, benefit-cost operations research, health services utilization and peer review studies. The chapter concludes with a model for health and health services. The previously exposed theories are incorporated into a framework which can guide an economic investigation of health programs.

A short description of the Western Michigan Comprehensive Health Services project introduces the particular case study in Chapter IV. Some of the preliminary explorations

undertaken during the course of this research are briefly reported in order to show what problem areas exist in analyzing health projects of this kind.

Since it became apparent that an elaborate input-output model was beyond the time and resource limitations of this dissertation, it was decided to concentrate on the measurement of health status as defined in Chapter III. Although most of the time was spent with output measures a particular topic on inputs--the concentration of inputs--was pursued in depth. The results of this investigation on inputs are reported separately in Appendix A.

The empirical research on output measures was divided into two parts: (i) an analysis of health status measures employing a health survey (Chapter V) and (ii) an analysis of school absence utilizing school attendance records (Chapter VI). Chapter V describes the procedure of comparison between a sample of residents of the project area (Lake County, Michigan) and a sample of residents of a "control" area (Montmorency County, Michigan). The procedure and results of a "health outcomes survey" in Lake County and in Montmorency County form the main body of this chapter.

Chapter VI gives an account of an investigation of school attendance as a measure of health services output. Both Chapters V and VI are not intended to produce "hard" results in terms of evaluating the Lake County Health Center. Rather, as previously indicated, they should be regarded as vehicles for building experience with health outcomes

evaluation. This caveat is especially relevant in light of the small sample size and the limited control of the elements under investigation.

Since the overriding objective of this analysis was to open avenues for further work in the area of project evaluation, the experience gained from this research is summarized in Chapter VII. This chapter advances procedures for an expanded investigation of investment in health services. Although the section concentrates on health, it is hoped that several of the suggested steps are also applicable to other types of projects.

Chapter VIII summarizes the total research effort and draws some overall conclusions from the work done. The tables and the Appendix contain information which might be relevant for further research with the data generated for this dissertation. The bibliography was organized by subjects covered in the research in order to serve as a summary of current literature on the various disciplines touched upon in this thesis.

FOOTNOTES

1. Shyamelendu Sarkar, "The Copper Country Medical Industry of Michigan as it Serves Rural People" (unpublished Ph.D. dissertation, Michigan State University, 1969).

2. Neville J. G. Doherty, "The Economic Structure and Performance of the Medical Industry in Michigan's Grand Traverse Region" (unpublished Ph.D. dissertation, Michigan State University, 1970).

3. U. S., Department of Health, Education, and Welfare, Toward a Social Report (Washington, D.C.: Government Printing Office, 1969).

4. Bettie L. Nelson, "Profile of Lake County and the Five-Cap Area," Michigan Department of Public Health, 1972, p. 59. (Mimeographed.)

CHAPTER II

A THEORETICAL GUIDELINE FOR ANALYZING PUBLIC PROJECTS

This section attempts to demonstrate the usefulness of the economic production and consumption model in guiding the process of evaluating public expenditure programs into relevant directions. The discussion is geared to the problem of evaluating health projects, but is general enough to serve as a guideline for the evaluation of other types of programs.

1. The Traditional Use of the Economic Model

Economic theory indicates that both market-demand and market-supply functions arise from a summation of the individual Marginal Cost (MC) and Marginal Utility (MU) curves which in connection with a price guides decisions of consumers and producers. Prices, in turn, are determined by the interplay of demand and supply as shown in Figure 1.

a) Market Failure

The model represents the situation of a perfect competitive market without restrictions of entry and where all participants reveal the utility they derive from their action in the market place. Obviously, this ideal situation does not exist in the health area which in economic parlance results in less than optimal resource allocation called "market failure." Two of the most prominent causes of market

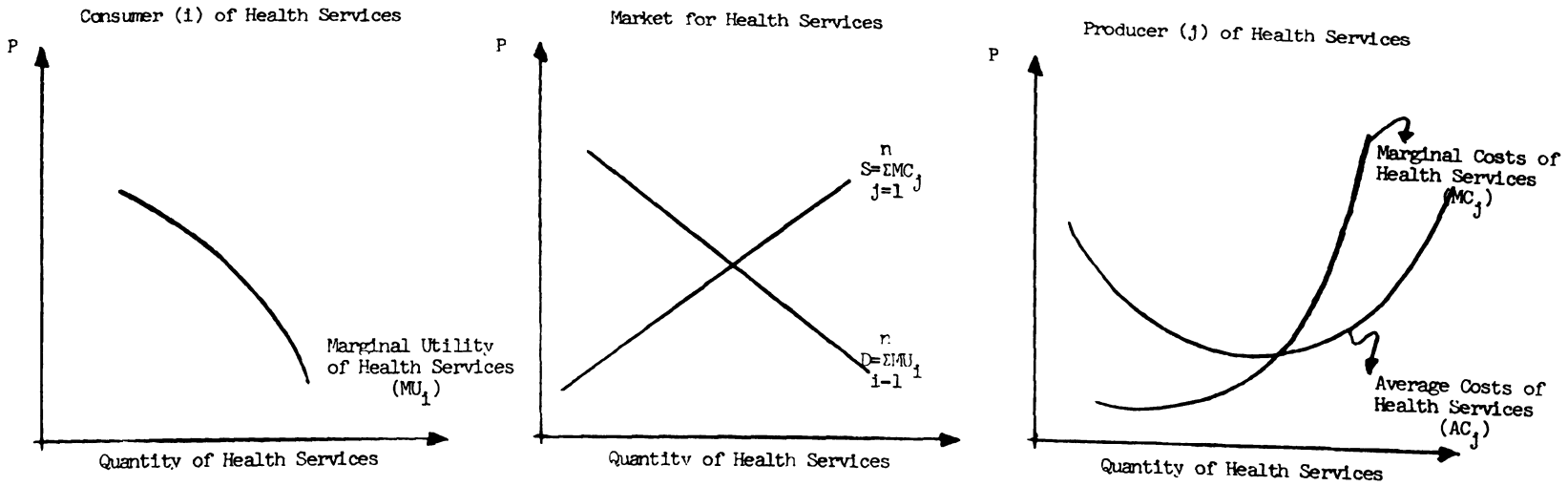


Figure 1. Market Model for Health Services.

failure in the health field are monopolistic conditions and externalities.

Monopoly

It is a widespread opinion that medical services are suffering from a monopolistic market structure. This fact changes the determination of market prices and quantities. A removal of the monopolistic situation would cause an increase in producers and in the production of medical services resulting in a decrease of the price level which, in turn, would result in an increase of the consumption of health services. Competitive pressure could increase productivity, quantity and quality of services. Some, however, would argue that a completely competitive situation would degrade the quality of service. The following discussion assumes that monopolistic conditions have been abolished and that Figure 1 depicts the actual situation. (A redefinition of the role and functions of medical professionals and increased training of medical and paramedical manpower makes the existence of a more competitive market a realistic assumption--at least for the future.)

Externalities

Pauly and others show that the simple market model has to be extended to account for externalities.[1] They argue that individual A derives utility from individual B's demand for health services. Since this utility is not represented in the demand functions of the simple model, the allocative mechanism of the market produces less than

desirable results. A's utility from B's consumption of health services can have two different origins depending on the nature of the externality: (i) communicable diseases and (ii) availability of care.

(i) Communicable Diseases

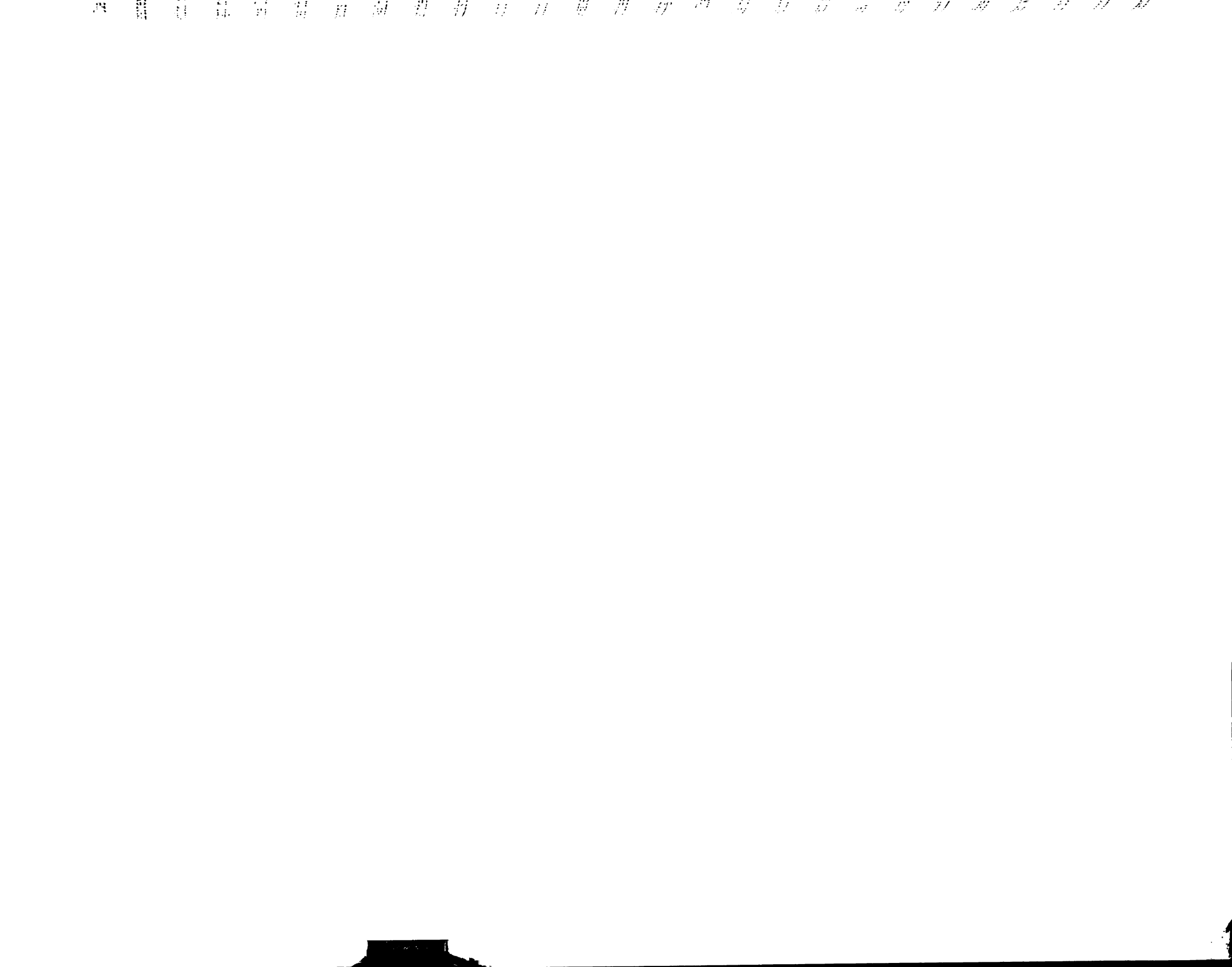
Individual A knows that, if B protects himself against communicable diseases, the probability of him (A) contacting these diseases has been significantly reduced. A is a free-rider on B's efforts to prevent diseases. Yet, usually B's success in preventing diseases depends on A's participation in preventive measures. B derives satisfaction from A's consumption of health services and A derives satisfaction from B's consumption of health services. A case of "reciprocal externality" has been established.[2]

(ii) Availability of Care

Externality arises here because individual A derives satisfaction from knowing that B consumes health services or has at least the option to consume health services.

b) Limitations of the Traditional Use of the Model

Much of past and current research in health economics uses variations of the health services model as presented in Figure 1 as the basis for analysis. The most striking feature for non-economists is the assumption of predetermined consumption schedules (MU schedules) which in connection with prices, determine the consumption of health services. This assumes that individuals know what amount of health services is enough for them as long as the price is "right."



Due to imperfections in the market and because of the character of the good, some of which were discussed in the section on "market failures", health services are being bought not only by individuals but also by "the public", such as the Office of Economic Opportunity (O.E.O.), which then gives them to individuals. Individuals as well as administrators of organizations like O.E.O. and the U. S. Department of Health Education and Welfare (H.E.W.) do not know a priori what the marginal utilities of provided services will be. Administrators rely on health services research and evaluation to provide them with this information. A sizeable portion of health services research deals with identifying the extent of desirable consumption and utilization of services. (Implicitly at least, this is analogous to establishing marginal utility schedules.)

The model as outlined above is, therefore, of little value to public decision makers and to individuals since it does not tell them why different individuals consume different amounts of health services at the same prevailing price. Actually, the model is not even intended to explain this variation, according to its creators. Neoclassical economic theory is based on the assumption that there are different tastes which determine as such the market. In other words, the difference in marginal utility derived from consuming health services is predetermined and causes, in connection with a given price, different consumption patterns of health services.

c) The Traditional Use of the Model and Research in Health Economics

The model has been useful in pioneering research and contributed significantly to the development of health economics as an applied field.

Most of this research concentrates on health services and on how to produce these services more efficiently. Very few economic research efforts have been spent on evaluating how to produce health and health status more efficiently. The traditional use of the model does not challenge the researcher to attempt a health status evaluation. This statement is not meant to indicate that there is no economic tool available for evaluating health projects. On the contrary, the principles of economics (i.e. allocation of limited resources to satisfy unlimited wants) form the basic rationale for project evaluation. What this chapter attempts to expose, however, is the fact that the traditional economic model is an incomplete representation of the actual situation which it tries to simulate. The incompleteness of a model is significant if it forces empirical research to restrict itself to a limited format as prescribed by the model.

It is the author's belief that the traditional use of the model unnecessarily restricts the scope of health economics research. This paper advances the position that a more relevant model will serve not only to broaden the outlook of research in health economics but will also provide

those concerned with evaluating health projects (and other projects) with a relevant procedural guideline. To make economic theory useful in health services evaluation, the simple model has to be expanded in such a way as to facilitate explaining the difference in marginal utility schedules which exists among individuals.

2. The Expanded Use of the Economic Model

The concept of "derived demand" and the "New Theory of Consumer Demand" are suggested as additions to the traditional model in order to transform it into a useful framework for health services research. If put into that framework, health services become inputs into the individual's production process of the output health. In other words, the demand for health services is actually a demand "derived" from the demand for health.[3] We demand health services because they have the ability (attribute) to produce health. The "New Theory of Consumer Demand" adds to the concept of "derived demand" the notion that the same attributes can be found in a variety of physical goods.[4] We demand, therefore, different goods because they harbor different inherent characteristics which we need in producing desirable outputs. This forces the investigator to realize that utility is not derived from consuming health services but rather from consuming the attributes of health services, i.e. from consuming health. An important fact emerges: The commodity "health" can be produced by consuming various market and non-market goods (health services and others)

which harbor the health producing characteristics. Individuals differ, therefore, in their demand for health services not because of given differing tastes concerning health services but because of a given differing command over various goods containing health producing attributes.

3. Relevance of the Expanded Model

The theoretical significance of the expanded model lies in the fact that it explains the variation in the demand for health services.

a) Output-Orientation

The implications for practical research are even more significant. The model is a useful guide for shifting thinking away from input analysis (health services) towards input-output analysis (health services--health). This shift towards output orientation is especially called for in evaluating public projects, be they in the health area or in other fields.

b) Systems Thinking

Another advantage of the expanded model is its ability to guide a classification of system components according to relevant attributes. Once the components have been classified it is possible to combine them in such a way as to conceptually maximize desired output, subject to given prices and resources constraints.

Research of interacting systems is facilitated by the fact that, regardless of the source commodity, attributes are measured in identical units. For instance, classifying

social programs into their characteristics will show which programs have health attributes. If the objective is to maximize health, economic theory dictates that the social programs under investigation be combined by applying the equimarginal principle to both the programs and the inherent characteristics. Those familiar with program planning and budgeting will recognize that this corresponds to the conceptual foundation of PPB systems.

4. Applications of the Expanded Model to Research in Health Economics

The expanded model suggests an output orientation in health economics. In most instances, this reorientation would only require a relabeling of the axes of the traditional model. For instance, in Figure 1 we would consider "health" as the commodity being produced and consumed instead of health services. Pauly's externality discussion should be recast in terms of individual and collective demand for health.[5] Pauly states that individual A derives satisfaction from individual B's consumption of health services. Using the expanded model we would represent the actual situation, i.e. that A derives utility from B's health.

5. The Complementarity of the Traditional and the Expanded Model

The externality example serves to put the expanded model into a proper perspective. People do not only get

satisfaction from knowing that someone who is sick gets well but also from knowing that this person gets at least some kind of health care, regardless of whether or not this care will result in a desirable health status.

The complementarity argument is extremely relevant in applying the discussed concepts in an empirical investigation. Information on attributes or characteristics is difficult to obtain. The investigator will often be forced to confine his analysis to proxies of the attributes--usually to the source commodities which harbor the characteristics. For instance, in the case of health projects there is much information available on health services but less on health.

Again, it is emphasized that the limited information on actual outputs is no excuse for (i) faulty conceptualization of the study and (ii) for not trying to get more relevant proxies for the actual outputs.

6. Research on Production Functions of Public Projects

An output and systems orientation suggests that the evaluation problem of public expenditures be put into a production function framework. This framework can be conceptualized by the following set of equations:

$$Y_1 = a_{11} x_1 + \ldots + a_{in} x_n$$

$$Y_m = a_{m1} x_1 + \ldots + a_{mn} x_n$$

where Y_j = output (j), x_i = input (i) and a_{ij} = input/output coefficients.

a) The Problem of Classifying and Measuring Input and Output Variables.

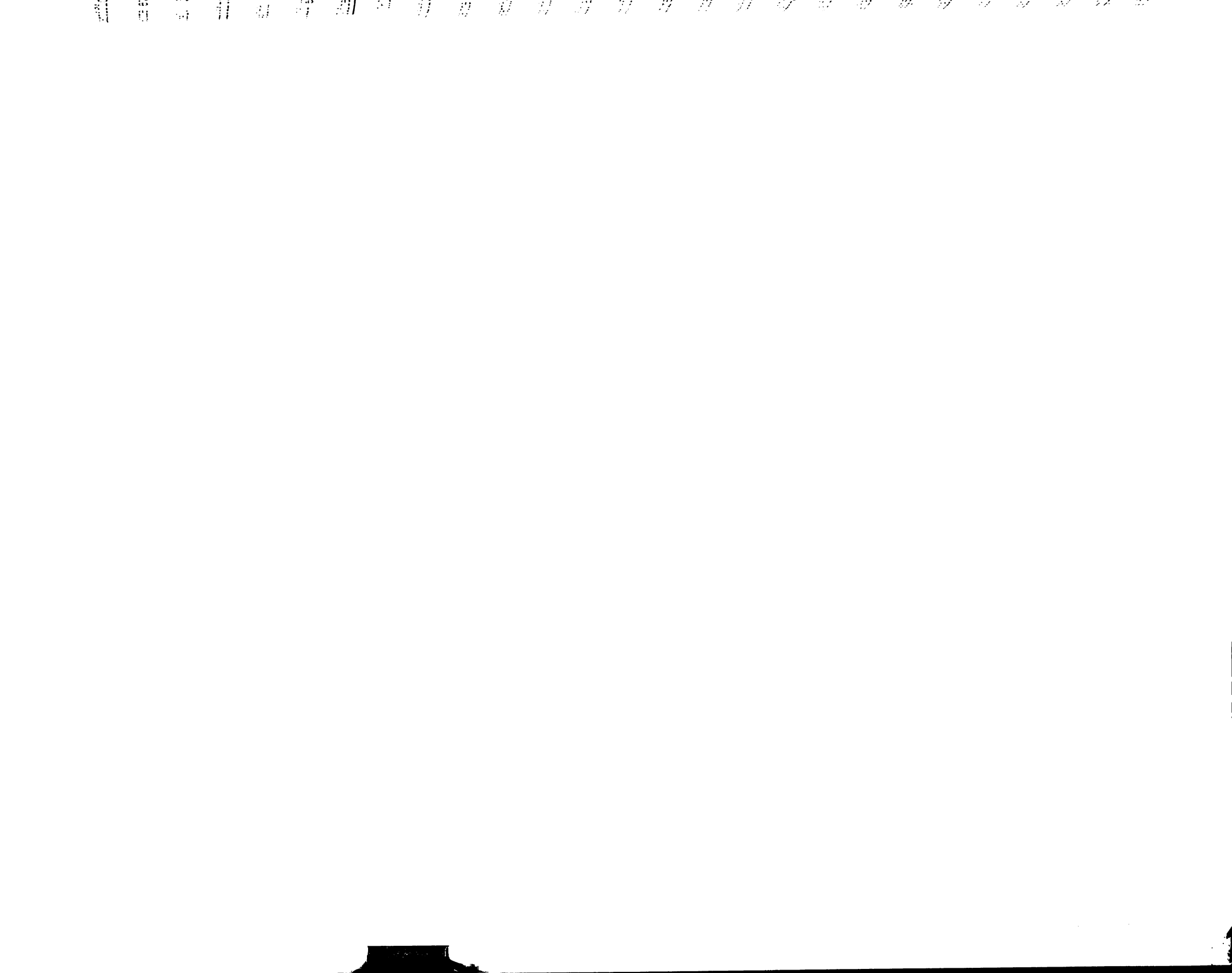
Usually one assumes knowledge of the characteristics of x_i and Y_j and of the units with which they are to be measured, thus leaving the calculation of the input/output coefficients as the major task of the production function analysis. One of the main problems in estimating the input-output relationship of infrastructural investment is to get relevant classification and measurement of inputs (x_i) and outputs (y_j).

A related problem is the selection of input and output groups which would permit a comparison of input-output relationships under different forms of organizing the production process. (This issue could be termed the problem of "additivity" and "scalability").

b) Conceptual Solution--Classification According to Attributes

Again, the awareness of the fact that theoretically all activities can be viewed as consisting of production and consumption is necessary for an understanding of the conceptual solution to the classification problem. In fact, production and consumption are two sides of the same phenomenon: while I consume a good, I produce the satisfaction which is derived from its consumption.

The problem of the analyst is to find out where in the chain of real and conceptual input-output relationships he should start and call the variable involved the "Desired Output." Under the guidance of the "expanded" model, the



identification of relevant input and output categories has become even more complicated than under the "traditional" model. Suddenly we are faced with a situation in which commodities which were originally perceived as outputs (health services) have to be classified as inputs. What should guide the choice of the dependent variable?

c) Guidelines for the Choice of Variables

Only vague guidelines can be offered. Experience, intuition and common sense, i.e. the "art" of research are the major ingredients for a successful investigation. Nevertheless, it can be said that the variables chosen must pass the test of (i) relevance and (ii) feasibility. Scientific advancements have usually depended on the specification of relevant variables. To use an example from agriculture: it is not manure which is the commodity demanded for the production of crops but its minerals and organic attributes. The odor of manure is a characteristic which usually is neither desired in itself nor is it considered as a desirable input into the production of crops, although the handling of odorless fertilizer makes a farmer more "respectable" than if he would use manure. Manure has beneficial (desired) and costly (undesired) characteristics which enter the decision framework. By defining those desirable inputs clearly, science could provide us with different methods of organizing our productive efforts. To complete the analogy it should, however, be emphasized that the definition of the characteristics and the subsequent

development of new organizational forms of production evolved rather gradually and often accidentally. Also, the reorganized production brought with it a host of new problems--ecological deterioration is just one of them.

The development of crop research has a parallel in feeding research. Crops are not really the commodities demanded for the production of beef or for the production of meat. Only their inherent attributes are important and therefore demanded.

The example could be continued over many stages. What should be inferred from this demonstration is that the sometimes accidental recognition of relevant inherent attributes lead to subsequent measurement and a wider set of production possibilities--culminating in such seemingly "impossible" inventions as the development of soybean meat. Are there similar undiscovered options in the social sciences and how should we discover them?

d) Man the Product-Ingredient of Social Research

The output of social programs is not to provide a population with goods and services. The implicit ultimate goal is to produce and maintain individuals in a state which allows them to fulfill their roles as human beings in a dignified and acceptable way. The determination of those roles evolves out of the complex socio-political interaction of all individuals.

The concept of ultimate goals is not meant to degrade intermediate goals and objectives (or intermediate outputs).

However, it is meant to convey the notion that activities (input-output relationships) are organized under the assumption of having a direction. It is immaterial whether this direction is conceptualized as the "invisible hand" or as a social value structure. This study does not ask for a judgment on the superiority of objectives and goals but pleads to include all relevant input-output relationships into the analysis. The recommendation to those who evaluate social projects is, therefore, to include in the total system of "input-output chains" a production function where "man" is the output.[6]

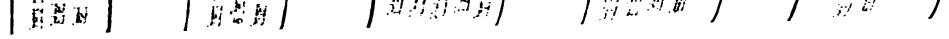
7. Research Procedure for Program Evaluation--A Summary

Economic theory as interpreted in this chapter suggests the following steps for an evaluation of public projects. (A graphical representation of those steps is shown in the flow diagram in Figure 2.)

Disaggregate the program system into relevant input-output relationships by utilizing the principles of Derived Demand and of the "New Theory of Consumer Demand." Relevancy has to be determined by the original objectives of the investigation.

i) Attempt to isolate relevant outputs of the program by checking for correspondence with the social, cultural and political value structure.

ii) Attempt to measure the units of input and output by applying findings of social and natural science research.



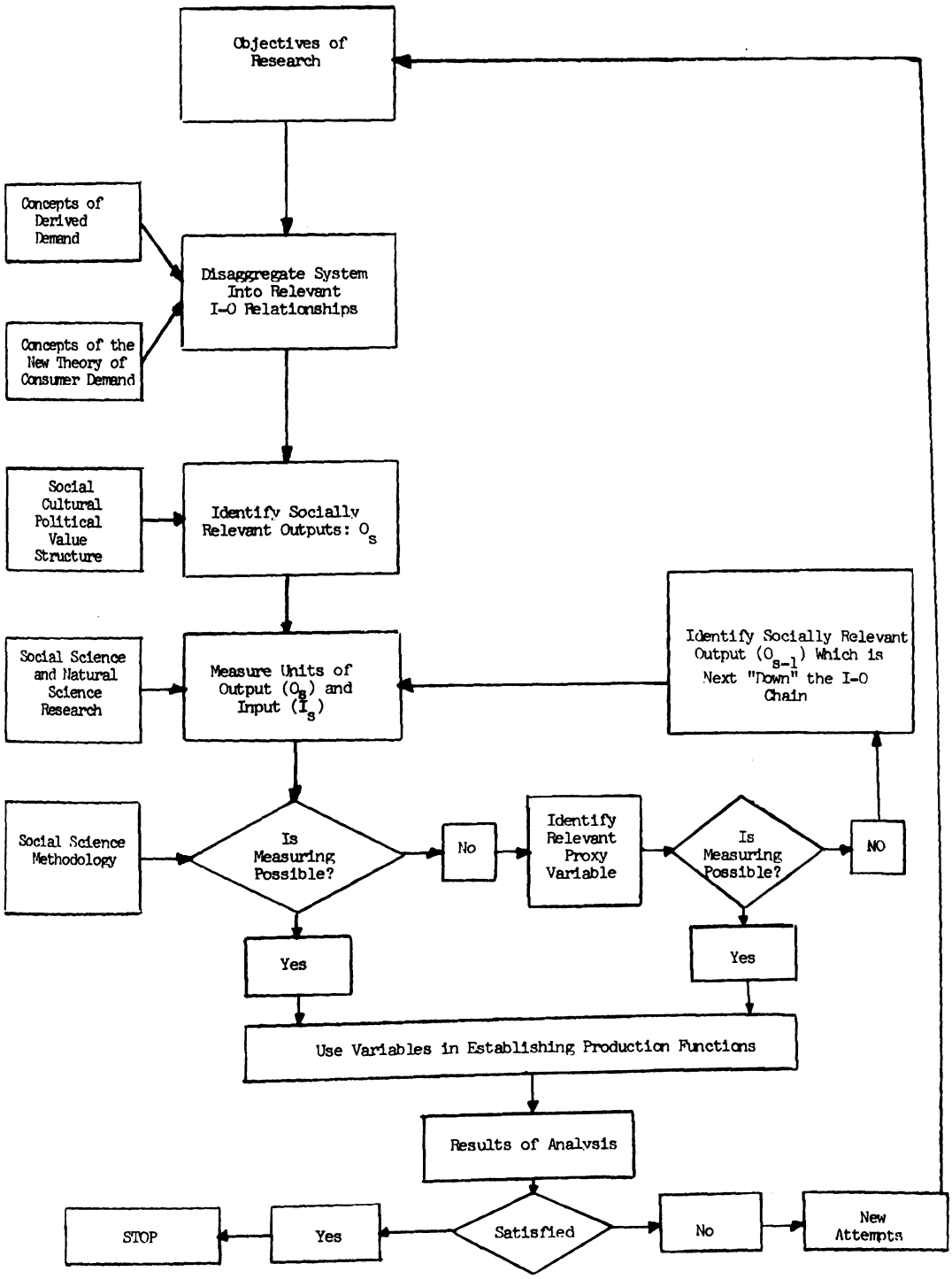


Figure 2. A Research Procedure for Program Evaluation.

iii) If measurement shows no success, settle for relevant proxy variable.

iv) If relevant proxy variable is not available or if measurement of proxy variable is impossible, go to the next step "down" in the input-output relationships.

v) If measurement is feasible, production functions can be established. The degree of satisfaction with the analysis and its result will determine where improvement can or should be made.

The research documented in this dissertation followed the "philosophy" and procedure as outlined in this chapter and as summarized in Figure 2. The procedure did not specify what should be done at each step, yet it guided the "how" of the research in terms of specifying the outlook the researcher should take in attacking the problem at hand.

FOOTNOTES

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2. James M. Buchanan and Gordon Tullock, "Public and Private Interaction under Reciprocal Externality," in The Public Economy of Urban Communities, ed. by Julius Margolis (Washington, D.C.: Resources for the Future, Inc., 1964), pp. 52-73.

3. Earl O. Heady, Economics of Agricultural Production and Resource Use (New York: Prentice-Hall, Inc., 1952), p. 113.

4. Kelvin Lancaster, Consumer Demand: A New Approach (New York: Columbia University Press, 1971), pp. 6-12.

5. Pauly, op. cit., pp. 21-35.

CHAPTER III

EVALUATING HEALTH PROJECTS

Good health is one of the most desirable aspects of a person's life. Despite or just because of its central position in an individual's utility function, society faces seemingly insurmountable problems in wrestling with the concept of good health and in organizing resources in such a way as to achieve a satisfactory state of good health for its members.

At the root of the problems is the lack of a clear definition of good health and how it is produced. Only a satisfactory definition of health will permit us to tackle another set of equally disturbing problems, i.e., problems of distribution of health and health producing goods and services.

This chapter identifies the position of this particular dissertation in the health research field. The guidelines of the previous chapter are applied in identifying relevant input-output categories and existing data are examined in terms of their adaptability to evaluate research. A model of the "Health Status exchange system" and a model of the "Health Status production process" are offered as the framework for empirical analysis.

1. A Summary of Health Services Research

For the following discussion it seems advantageous to divide research efforts into the following broad classes: (a) "Intermediate" Input-Output Evaluation and (b) "Ultimate" Input-Output evaluation.[1]

The terms "intermediate" and "ultimate" are based on the discussion in the previous chapter. They are chosen in order to indicate how well the analysis succeeds in evaluating the project's contribution to "man the product." In other words, "ultimate" is a relative term and no value judgment.

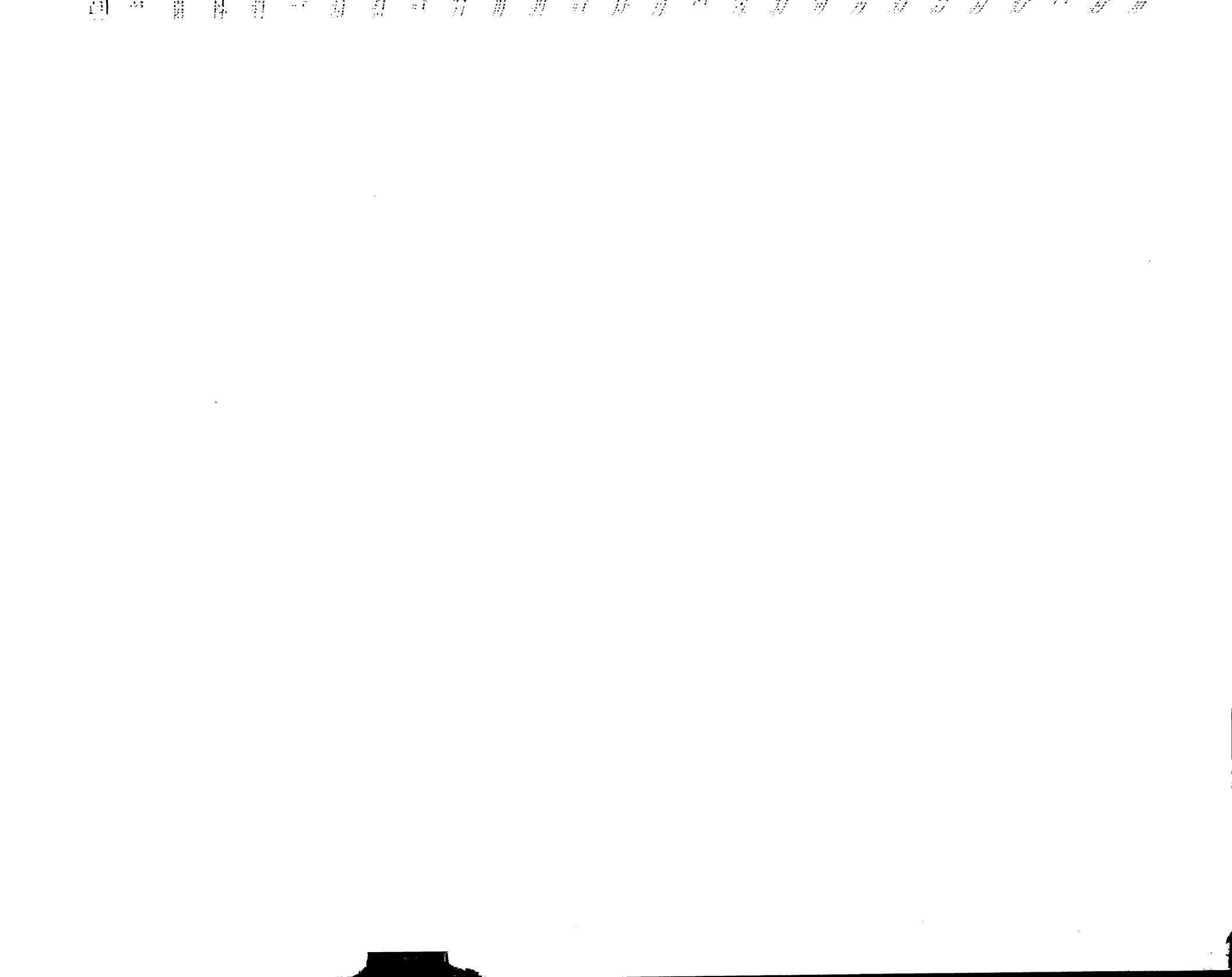
a) "Intermediate" Input-Output Evaluation

Studies falling under this category assume the desirability of certain health services and evaluate the process by which those services are produced and delivered. The most prominent representatives of this group are

(i) Operations research studies which investigate problems such as the allocation of hospital beds, staffing of hospitals and scheduling of patients.

(ii) Health services utilization studies if they are only interested in the "proper" or adequate utilization of health services.

(iii) Peer review evaluation. This procedure consists of establishing whether patients get that kind and extent of care which is dictated by current medical knowledge and professional standards.



b) "Ultimate" Input-Output Evaluation

Studies following this line of thinking are mainly interested in the impact of certain procedures, projects or programs on health related outputs. The various activities in this area are:

(i) Epidemiological studies. These studies establish relationships between harmful or beneficial conditions and the incidence of disease.

(ii) Project evaluation of the cost-effectiveness variety which determines the impact of health services on certain disease-or health related characteristics and the effect of these on human activity.

(iii) Project evaluation of the cost/benefit variety which attempts to assign a monetary value to the impact of health inputs.

The focus of this study is on organizing an "Ultimate" Input-Output evaluation. Both the cost-benefit and the cost-effectiveness approach assume a high degree of information on health outputs and what is even more important, they assume a knowledge about the health services-health (I-O) relationship. This information about health outputs and their relationship to health inputs does often not exist. Epidemiological studies, on the other hand, attempt to specify an input-output relationship (cause-effect).

This thesis is essentially of the epidemiological variety. Traditional epidemiological studies have concentrated on associating the presence of diseases with various causes.[2]

The present study by contrast attempts to associate the level of health status with the presence of various health input combinations. Knowledge created through this kind of a "epidemiological" input-output analysis is a necessary and thus far often unobtainable ingredient for cost-effectiveness and cost-benefit analyses.

After having established how this thesis fits into the general picture of health services research it is appropriate to follow up with a discussion of the relevant inputs and outputs embodied in this type of health services evaluation.

2. Relevant Input-Output (I-O) Relationships

The health and health services sector consist like other systems of a vast number of I-O relationships. We have X-ray machines "producing" diagnostic materials, doctors who "produce" operations, hospitals which "demand" capital for further investment and last but not least, patients who "demand" health services. Chapter II indicates that research will only be successful if it is initiated by a careful specification of relevant I-O relationships.

a) Objectives of the Investigation.

Relevancy is largely determined by the objective of the research and the questions asked. If it is of interest to find out how many doctors and nurses are needed to perform (i.e. produce) a particular operation, the relevant inputs will be doctors and nurses. On the other hand, if the objective is to determine how to produce a "good" operation most efficiently the relevant inputs might be skill-level of

performers. Should the objective be to make the patient healthy through an operation, the relevant output will be a healthy patient in both cases.

Most people will claim that the last objective (producing a healthy patient) would be the only relevant output to them if they were the patients. Unfortunately, very little research has been produced which identifies the healthy patient as the ultimate output. Much of the evaluation research assumes that the services as provided have a beneficial impact on the patient's health and that all services are equally needed.

This thesis departs from the assumption of a given relationship between health services and health. More so, it attempts to define this relationship. The objective is not to establish a relationship between special types of medication or care and health but to specify the relationship between certain institutional forms and arrangements of providing health services and the health status of the population under consideration. The stated objective suggests that the relevant I-O relationship for this particular kind of investigation is the relationship between health services and health.

b) The Output-Health and Its Measurement

The World Health Organization defines health as "a state of complete physical, mental and social wellbeing and not merely the absence of disease and infirmity."[3] Attempts to utilize this definition in practical research

have shown that it is impossible to operationally define either complete wellbeing or the absence of disease.[4]

However, the definition is intuitively appealing since it directs our thinking to the achievement and maintenance of health and away from concentrating solely on the treatment of disease. This focus is clearly the basis for the current emphasis on providing health through Health Maintenance Organizations (HMO's).[5]

Mortality Indicators

The lack of a clear and operational definition of health and the ease to define death explains the traditional reliance on mortality rates as one of the most accurate health indicators. Mortality rates are indeed useful long-term indicators of the health status of populations. They have been successfully used in documenting the achievement of modern medicine over time and in cross-country comparisons.[6]

Health and Disease Indicators

Unfortunately, the total spectrum of health which lies between "perfect" health and death is only roughly captured in an index of mortality. The inadequacy of mortality indices becomes even more significant if one considers that the health status of the total <u>living</u> population is somewhere on this continuous line between "perfect" health and death, a line which we apparently can only measure with great difficulty. A definition of the health status of the living population is, therefore, the basic requirement

for rational planning in the health sector. Such a health status index has to be useful both in establishing need levels for further action and in evaluating the accomplishment of those programs.

But what are valid health status indicators? A multitude of professional papers and extensive research have addressed themselves to this problem. A review of the literature on this problem suggests a division of the health status indicators into disease-oriented indicators and adjustment-oriented indicators.[7]

c) Disease-oriented Indicators

They are indices of the incidence and prevalence of disease and disabilities. They do not specifically consider the impact of the particular disease on the individual's behavior. Their acceptance as an indicator of health depends on our society's implicit understanding of the impact of diseases. Usually, however, such understanding is lacking, especially where individuals have already adjusted to diseases and disability, e.g. have chosen a profession or life style which permits them to be fully productive despite disease or disability. Another critique voiced against disease--oriented data as a measure of health status is founded in the difficulty of standardizing the collected information, i.e. when is something a disease and when is it just a benign conditions?

Disease oriented data are, however, of extreme importance in epidemiological investigations where relationships

between causes and specific diseases are established. Their value in this kind of analysis explains probably why so many and varied disease-oriented data have been collected.

d) Adjustment-oriented Indicators

This type of indicator attempts to identify health status by the individual's adjustment to disease and disability. This adjustment manifests itself in two ways: (i) by taking curative action (curative action indicator) and (ii) by changing the kind and level of "usual" activities (role-fulfillment indicator). For instance, a person who has a disease might have to adjust his behavior by taking aspirin (curative action), by doing only light or no work (activity reduction) or by staying in bed all day (curative action and activity reduction). This example indicates that the two types of indicators do not describe completely different events but are often overlapping. People change their behavior in light of diseases because the new kind of behavior might cure the disease, might prevent the disease from progressing and/or is the only way to live with the disease.

Curative action indicator

Taking curative action as an indicator of health status produces considerable methodological problems since it uses the level of inputs (the curative action) as a measure of the output (health status). This assumption that curative action depends on the individual's perception of his health status is the rationale behind using curative adjustment as an indicator for health status. Input levels, however, are

in many instances more a function of the knowledge and purchasing power of the individual than of his health status. In addition, they depend heavily on the availability of the curative services. A third disadvantage is embedded in the fact that health services are consumed not only to cure a disease but also to prevent further diseases. Extracting that portion of services which reflects the health status at a given point in time creates often insurmountable difficulties.

Role fulfillment Indicators

Another form of behavioral adjustment to disease and disability is that adjustment which affects the functional role which individuals are expected to play in society. This definition of health is again based on a common understanding of what constitutes a person's role in society. This dissertation assumes that individual roles can be defined for particular segments of the population.

The advantage of the "role fulfillment indicator" is its output orientation. This indicator meets most closely the requirements of an "ultimate" output or outcomes-indicator, as was outlined in the previous chapter. In other words, the indicator captures the "characteristics" of health, i.e. the degree of ability to fulfill one's role in society.

Suggested measures of a "role fulfillment indicator" would be activity restrictions in play, work and recreation, days of school missed, days of play and recreation lost,

days of work lost. An ideal indicator would also differentiate between complete activity loss and activity reduction. (Selma Mushkin refers to this situation as "debility.")[8]

e) The Inputs - Health Services

This thesis will treat health services as inputs although it is obvious that they themselves are outputs of a different level production system. For analytical purposes it is important to group health services into relevant categories. Classification is usually provider oriented (e.g. hospitals, doctors, beds, etc.), disease oriented (T.B. clinics) or patient oriented (e.g. baby clinic, nursing home).

Most classification systems rarely seem to satisfy the requirements of evaluation studies as outlined in the preceding chapter. There it was emphasized to classify inputs by attributes. Which characteristics or attributes are relevant will depend largely on the focus of the evaluation study. Health services may be investigated in terms of their attribute of capital intensity or in terms of the skill level of providers or in terms of their "preventiveness," or, as suggested in Appendix A of this study, in terms of concentration ratios.

The choice of the relevant output will depend on the reasons for using health services. Realizing that we demand health services not in themselves but because of some (or all) of their inherent characteristics we have to ask

what role those services play in the production process. Again, we rely on the notions of "characteristics" in choosing a relevant classification of health services.

3. Data Research

Research on data for health services evaluation has been significantly increased over the past decades partly because of the increasing capacity of electronic computers and partly because of new development in social science thinking.

a) Social Indicators and Program Indicators

Data used by social scientists are often divided into Social Indicators and Program Indicators. Social Indicators are defined as indicators identifying conditions and problems which are of interest to the collecting agency. (Most of these indicators are collected at the national level although there are some local social indicator efforts.)[9] Program Indicators are defined as indicators which describe the impact of programs (or projects) on various variables of interest.

b) Confusion in Indicator Terminology

The term "program indicator" is often misused and consequently misinterpreted. It is a common practice to collect information on outputs of programs and call this information program indicators. Such a procedure does not really establish the output which has been produced by the program but just counts the output which exists in the presence of

the program. Yet, this output might have been produced (and usually is produced) by a variety of other inputs not supplied through the program. The procedure is a "before and after" analysis and not an evaluation of impact. What characterizes an evaluation of impact is a "with and without" analysis, which can only be accomplished by isolating the impact of project influences from non-project influences. Without associating specific outputs with specific input activities Program Indicators and Social Indicators describe the same phenomenon. Although this is a convincing argument much confusion exists in using and interpreting the two concepts.

This study, therefore, suggests that the impact of a particular program on a particular output indicator be called the "Program Output Coefficient" (POC) and that the terms "Social Indicator" and "Program Indicator" be used in describing the state of the output. This distinction can be represented in mathematical terms by the equation

$$I = C + p\ (X_p) + n(X_n),$$

where I is the state of the output measured by its indicator and p is the "Program Output Coefficient." (C is the constant term in the equation, X_p represents program inputs, X_n represents non-program inputs and n is the output coefficient of non-project inputs.)

In summary, Social Indicators and Program Indicators describe states of the output (they are absolute measures) while "Program Output Coefficients" describe their relation

to programs--they are measures relative to inputs. The division between Social Indicator and Program Indicator should be reserved for differentiating the objective of the collecting agency. Indicators which are collected with the evaluation of a specific program in mind should be called Program Indicators. Indicators which are collected to record socially relevant events should be referred to as Social Indicators.

4. Health Data Collection

a) Nationwide Efforts

Data collection for national social indicator purposes has been going on for several decades and is largely organized through the National Center for Health Statistics. The basic instrument for data collection is called the National Health Survey which consists actually of several different surveys which are divided into three parts:[10]

(i) The Health Interview Survey--a continuing nationwide sampling and interviewing of households;

(ii) The Health Examination Survey--physical examination and testing of samples of individuals; and

(iii) The Health Records Survey--sampling and interviewing of organizations and institutions related to health care. Summaries and analyses of the findings of the National Health Survey are documented in 22 different "vital and Health Statistics Publication Series" which are published by the National Center for Health Statistics.[11]

b) Statewide and Local Efforts, Program and Project Data

Much of the experience gathered in establishing the National Health Survey and in subsequent analysis has been useful in research directed towards program evaluation. Due to the variation in programs and projects and due to the lack of universally applicable evaluation procedures, no uniform data system is available at the project or local level. Deshaies and Seidman give an excellent summary of available components of health information systems.[12]

They divide the available data base into the following groups and discuss how the information has been or could be obtained and what problems are connected with using the particular data:

(i) Status of community health consisting of 19 component indicators.

(ii) Utilization of health services (18 different measures are reported.)

(iii) General population and housing characteristics: (50 component indicators).

(iv) Inventory of health facilities and health manpower (43 component indicators).

(v) Status of community environment (38 components).

The paper is an outgrowth of the author's involvement in the New Haven Census Use Study which is the first large scale regional-local effort of generating health data for local indicator and project evaluation purposes.[13]

5. A Model of the Health Status Exchange System

From the preceding discussion, it is now possible to establish a model of the health production and exchange system which can set the stage for an empirical investigation of the health production process. The block-flow diagram of Figure 3 serves as a simulation of that system. The model differs from traditional presentations by considering "Health" a tradable output instead of treating health services (operations, beds, etc.) as outputs of the system. Health services are treated as inputs in this framework.

a) The Commodity-Health Status

The model employs the concepts which were explored in previous chapters by indicating that health is not demanded as an end in itself but because of its characteristics or attributes. These attributes of health permit the individual to fulfill a socially desirable role and to fulfill his role in a way which is acceptable to him and his environment.

What are socially desirable roles? Members of a heterogeneous society have many roles, but, as previously suggested, it is possible to isolate some major groups of roles: Infants are "expected" to play, when they grow older they are "supposed" to go to school and play. Adults are "supposed to" work on the job and around the house. Retired people "should" be able to do a little bit around the house. The four major roles (play, go to school, go to work, work at home) are summarized by the term Health Status. Health measured by the summary term of its attributes (i.e. Health Status) is at the focus of the system displayed in Fig.3.

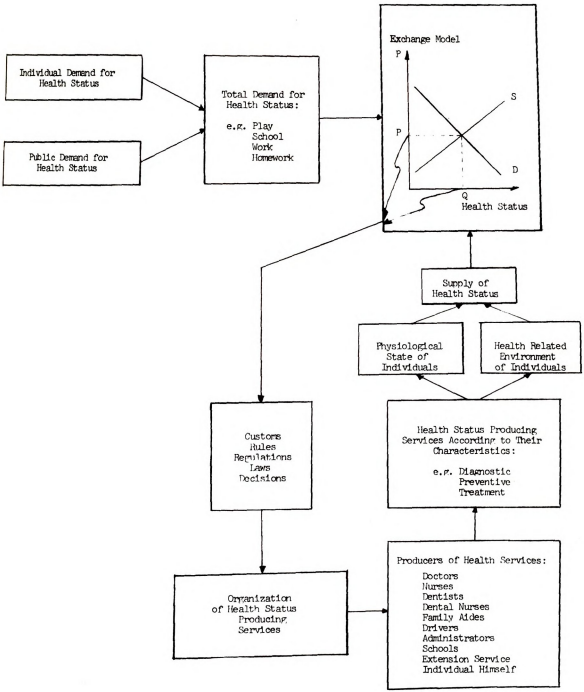


Fig. 3 — A Simplified Model of the Health Status Exchange System.

b) Exchange of Health Status

Individual and public demand together determine the total demand for Health Status (play, school, work and homework). This Health Status is supplied by the health production process which acts through improvements and maintenance of the physiological states of individuals and of the health related environment. To make the variety of health status producing inputs manageable they are disaggregated according to their characteristics. These characteristics can be produced by many different health services producers, such as doctors, nurses and the individual himself.

c) Organizing and Reorganizing the Production

The present form of organizing the production of a desirable Health Status is governed by a set of customs, rules, regulations and laws. Thus a female patient may or must not have an abortion; an abortion "expert" may or must not perform such an abortion. A nurse may or must not make an examination. These rules were once established because a majority (representative or not) decided to do so and because the particular organization of the services seemed to satisfy needs. If we think that needs are not adequately met (given the available resources), we look for ways to reorganize the present production process.

The interplay of demand and supply of Health Status will determine prices and quantities of Health Status which is the measure of success or failure. Dissatisfaction with prices and quantities of Health Status will put pressure on

the organization of the health producing services. The reorganization can occur via technical improvement and/or through changes in the rules and laws. Based on our previous discussion, the suggested way of successfully reorganizing is by concentrating on the actual productive characteristics of Health Services producers. The suggested characteristics of inputs are "diagnostic," "preventive," "treatment," yet any other relevant grouping is possible.

6. A Summary Model of the Health Status Production Process

Since this study concentrates on establishing a production function of Health Status as the basis for evaluating health projects, a mathematical summary of these functions is offered herein. Portions of the model will subsequently be applied to a case study of evaluating a health project.

Health is represented by the indicators of Health Status which is expressed by a vector H.

$$H = \begin{bmatrix} h_1 \\ h_2 \\ h_3 \\ h_4 \end{bmatrix}$$

where h_1 = play days, h_2 = schooldays, h_3 = work days and h_4 = homework days. These are the indicators dealt with in this study. Other research objectives will require considering additional indicators of health status. For instance, the "quality" of a work day might be identified

by the attitude of the worker. Similarly, mortality rates (a negative measure) can be included, since they represent complete non-fulfillment of roles.

A production function between Health Status H and Health Services HS is established by

$$H = f(HS)$$

Since Health Services consist of many different (often non-additive) types of services all services are disaggregated into Health Status producing characteristics $c_1 \ldots c_n$ (diagnostic, preventive, treatment, etc.). These characteristics are represented by vector HC.

An advanced model would, therefore, establish a production function of

$$H = g(HC)$$

and would infer from this information and from the price relationships which combinations of Health Services should be used for the production of Health Status.

The following empirical analysis does not go that far. What is attempted is essentially an estimation of the relationship

$$H = f(HS)$$

which describes Health Status as a function of Health Services. Subsequent chapters discuss the methodology of estimating this equation in the context of an O.E.O. health project.

FOOTNOTES

1. The Michigan PBE System define them as "outputs" and "impacts" respectively.

2. Burton and Smith give summary of the development of epidemiological research. See Lloyd Edward Burton and Hugh Hollingsworth Smith, Public Health and Community Medicine for the Allied Medical Professions (Baltimore: Williams & Wilkins Co., 1970).

3. World Health Organization, "Constitution of the World Health Organization, Annex I," The First Ten Years of the World Health Organization (Geneva: WHO, 1958).

4. Iwao M. Moriyama, "Problems in the Measurement of Health Status," Indicators of Social Change, edited by Eleanor Bernert Sheldon and Wilbert E. Moore (New York: Russel Sage Foundation, 1968), p. 586.

5. Ernest W. Saward and Merwyn R. Greenlick,"Health Policy and the HMO," The Milbank Memorial Fund Quarterly, Health Services Research, Vol. I, No. 2, Part I (April, 1972), pp. 147-76.

6. John C. Deshaies and David R. Seidman, "Health Information Systems," Socio-Economic Planning Science, Vol. 5 (1971), pp. 515-33.

7. D.H.S. Griffith, D. V. Ramana, and H. Marshaal, "Contribution of Health to Development," International Journal of Health Services, Vol. I, No. 3 (1971), pp. 253-70.

8. Selma J. Mushkin, "Health as an Investment," Journal of Political Economy, Vol. 70, No. 5, Part 2 (October, 1962), pp. 138-43.

9. For a summary of these efforts see: Eleanor Bernert Sheldon and Wilbert E. Moore, eds., Indicators of Social Change (New York: Russel Sage Foundation, 1968).

10. U.S. Department of Health, Education, and Welfare, Public Health Service, Origin, Program, and Operation of the U.S. National Health Survey, Vital and Health Statistics, Programs and Collection Procedures (Washington, D.C.: Government Printing Office, 1963), pp. 9-17.

11. U. S. Department of Health, Education, and Welfare, Public Health Service, Vital and Health Statistics, formerly Public Health Service Publication No. 1000 (Washington, D.C.: Government Printing Office).

12. Deshaies and Seidman, op. cit.

13. U. S. Department of Commerce, Bureau of the Census, Census Use Study, Report No. 12: Health Information System-II (Washington, D.C.: Government Printing Office, 1971).

CHAPTER IV

AN ANALYSIS OF THE WESTERN MICHIGAN COMPREHENSIVE HEALTH SERVICES PROJECT (WMCHS)

1. The Project and Its Service Area

The area served by the Health Center includes the four adjacent counties of Manistee[1], Mason[2], Lake[3], and Newaygo[4] located in the western central part of Michigan's Lower Peninsula. All four counties shared a common economic history during the lumber period of the 19th century. After the lumber boom settlers began cultivating the soil and small industries were established. However, the proximity to Lake Michigan with its locational and climatic advantages favored a more rapid and longer-lasting growth of agriculture as well as of industry in the areas along the coast. Since the empirical investigation concentrates on Lake County, only this county is described in greater detail.

a) Lake County

Appendix Table B2 gives a summary of the demographic and economic conditions of Lake County and is self explanatory. If one compares Lake County with the adjacent rural counties, one realizes that one of its most peculiar features is its relatively high proportion of black residents (Appendix Table B1): 1,296 of 5,661 residents (23 percent)

are black. (By contrast, Newago: 2 percent, Mason: 1 percent and Manistee: 1 percent).

b) History of the Black Population

Since a sizeable part of the black population is enrolled in the Health Project, it is appropriate to give a short account of the history of black residents in Lake County.

Until 1915, Lake County experienced a period of reduction of lumbering and milling activities common to most counties located in the northern part of Michigan's Lower Peninsula. Agricultural production was organized on fertile soil and small businesses came into existence to supply the predominantly agricultural population with everyday necessities. As in most other northern Michigan counties, the population was composed of Indians and descendants of European immigrants. By 1915, there were also five black families residing in this area[5].

During 1915, the Idlewild Resort Company was organized with the goal to develop the forests and lakes in the Northwest corner of Yates Township into a resort where black residents from Chicago, Detroit and Grand Rapids could buy recreational property without any restriction. Fourteen thousand lots were parcelled out of 1160 acres around Idlewild and buyers were attracted from all over the country. Similar ventures were subsequently undertaken in the other townships of the county resulting in several black recreation settlements: Lakewoods Acres and Lakeland Acres

in Webber Township, Idlewild Resort in Yates Township and Cherry Valley Township, Idlewild Terrace in Yates Township and Pleasant Plains Township.

Some of the promoters distorted the fact that the majority of lots were useful only for resort purposes and much of the land was bought under the wrong impression that the soil was fertile and that there were enough nearby industries which could provide part time employment. The growing recreation industry did open up many summer job opportunities for black employees. But many of them did not want to and could not return to the cities after the summer months. The trend to choose Lake County as a permanent residency was accelerated during the years 1930-35 due to the bleak prospects which the city population faced during the depression period. Most of the migrants were "elderly people or widows with small or no pensions; unemployed people drifting to relatives; people no longer able to secure relief in Chicago; and earlier purchasers now turning to their last resource. The township of Webber was comprised practically in entirety of such colored families. In Yates township, they were in the majority."[6]

After the depression years, "Idlewild" became one of the most famous resort areas for black Americans. Leading black artists entertained big crowds in numerous night clubs and black residents of Lake County had at least sufficient summer employment.

Progressing integration and effective civil rights

legislation which improved conditions for black Americans brought, however, the deathblow to black tourism in the Idlewild area. Blacks could enjoy resort areas to which they were previously denied access. Why should they come to Idlewild? And they did not come any more in such large numbers as in pre-integration days. The famous clubs disappeared and with them badly needed jobs and income for residents living in and around the resort communities.

Today, many black families still own property and cottages in Lake County which they visit during the summer but those visits generate insufficient income for the residents of the area. Those able and willing to leave Lake County did so, but many continued to stay in the county and live on a subsistence income. Several residents when asked by the author why they stayed here, indicated that their families preferred "a poor life in the woods to a poor life in the cities."

c) Developments Leading to the Establishment of WMCHS

The plight of many of Lake County's residents was recognized already in the 1930's. Statistics show that Lake County and vicinity has been lagging behind regional and state levels for several decades. The lag is of economic and social nature and has been frequently reported. Appendix Table B1 summarizes the available social and economic indicators for the four-county area in comparison with state and regional averages.

For this study it is of significance to note that by

1966 only two medical doctors were practicing in an area inhabited by more than 4000 people. This fact was one of the prime considerations for OEO to establish a comprehensive health center in Baldwin.

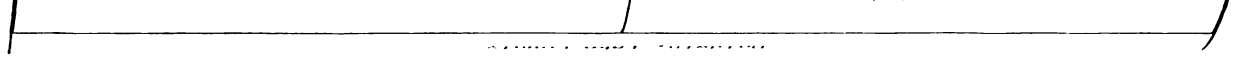
The regional community action agency (Five-CAP) with its seat at Custer (Mason County) applied for the OEO grant in 1966 and funding began in 1968. The Michigan Department of Public Health is the delegate agency which administered the grant. A board of trustees composed of health services consumers and other area residents facilitates local input into the administration.

OEO guidelines established eligibility for free medical care for the indigent population. These guidelines also stipulated that the project had to employ indigent local residents who had to be sufficiently trained with project resources. The project should not only deliver comprehensive health services to an impoverished rural area, but should show how this task could be accomplished by employing and upgrading the skills of the client-population.

In the fall of 1971 HEW took over the funding for the project. A reduction in funds was accompanied by some reorganization of the project, but did not change the overall structure.

d) Project Structure

Figure 4 shows that the project has facilities in four different locations. Administration, dental services and medical services are housed in the "Main Clinic" in Baldwin



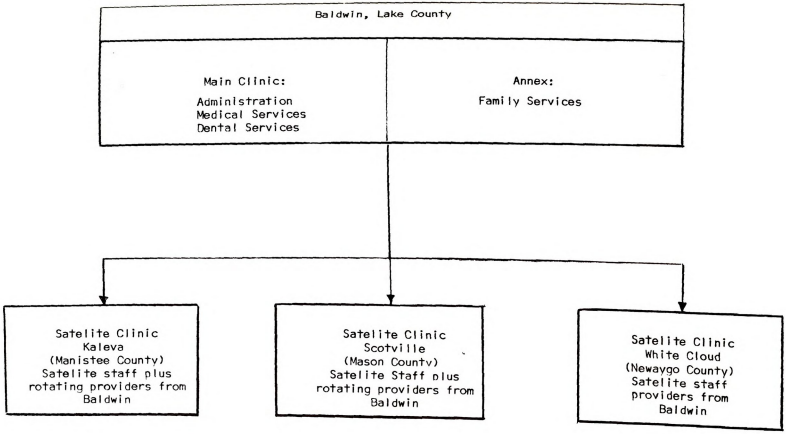


Fig. 4. Organization of Western Michigan Comprehensive Health Services Project.

(county seat of Lake County). Family services are located in a separate building ("Annex") in Baldwin. "Satellite" Clinics are located in each of the adjacent counties (Scottville, Kaleva, White Cloud). The Main Clinic and Family Services have a full time staff, five days a week from 8 a.m. to 5 p.m. (emergency services have been reduced because of cuts in funding). The Satellite facilities are staffed part time. Yet, all types of services, i.e. medical, dental and family services are dispensed to clients residing in the Satellite counties by rotating providers from the Baldwin Center. Hospital cases are referred to hospitals in Ludington (Mason County) and Manistee (Manistee County). Appendix Table B4 summarizes the budget of the past years.

2. Rationale for Evaluation

When, in 1971, funding of the project was reduced, it became evident that the administrators (HEW and MDPH) did not have sufficient information for identifying the contribution of various program parts (medical, dental, family services) to the achievement of the program objectives. Yet, they had to decide which elements of the project were to be reduced and Family Services experienced the largest reduction in funds. Someone in the line of project administrators felt that Family Services output was not worth their marginal costs. Was he correct? He was not, according to the Director of Family Services. Neither of the parties had a firm informational basis for defending its position. At the same time, it was well known to the project

administrators that some area residents including project clients were convinced that the project as a whole "was not worth its money." Yet, the waiting rooms were filled with patients every morning. Was it used only because the cost to the user was subsidized? What were the benefits of this project?

a) Previous Evaluation Attempts

OEO monitored all projects and issued quarterly statements on the progress of each Health Center.[7] Yet these reports gave mainly information on inputs and no information on the output. In 1971, OEO sponsored a more output-oriented evaluation of its health projects. The objectives of this evaluation were stated as follows:[8]

"i) Assessment of the Center's success in reaching their target population and determination of the extent to which eligible persons are effectively using the health care services provided.

ii) Determination of the degree of patient satisfaction with the care provided.

iii) Assessment of Center progress in developing a system capable of providing adequate care.

iv) Determination of programmatic similarities and differences between Centers and their relationship to performance.

v) Determination of the feasibility of developing a methodology to measure the anti-poverty impacts of Center services."

Although the objectives of the GEOMET study emphasizes an output orientation it fails to show whether the given care helped the target population in improving its health status. Additionally, it does not show whether different

institutional arrangements or different input combinations produced different output results. The most promising part of the study is the development of a methodology to measure the anti-poverty impact of health center services.

b) Objectives of this Study--Measuring the Output

The author's goal was to research the bottleneck of the GEOMET study and many other evaluation efforts, i.e. the isolation and measurement of indicators which could be useful in identifying the Health Status output of the Health Center.

3. Procedure of Evaluation

The model upon which this evaluation is based was summarized in Chapter III by the equation H = f(HS), i.e. Health Status is a function of Health Services inputs. To establish this relationship it was necessary to select relevant variables describing input and outputs.

a) Choice of Output Variables

The concepts of Chapters II and III served to develop a list of possible output indicators. Research in the social and natural sciences was reviewed in order to check for previous efforts in measuring the selected variables.

Survey methods research and especially the methodological research of the National Center for Health Statistics helped in narrowing down the list of suitable output indicators. The following "role-fulfillment" indicators emerged as final candidates:

i) Days missed from work because of health related reasons.

ii) Days when health conditions prevent the individual from his usual work at home

iii) Days missed from school because of health related reasons

iv) Days when health conditions prevent children from their usual play.

Other indicators, such as an index of activities of daily living (ADL)[9], attitudes, community involvement and family functioning, were considered as outputs, but were discarded because of resource and time limitations and because it was felt that they were indicators of a different output level.

b) Choice of Input Variables

Since one of the main functions of an input-output analysis is to facilitate the reorganization of inputs it was decided to group health services according to characteristics which reflect reorganization possibilities. The following groups emerged:

i) Location of service (main clinic, satellite clinic)

ii) Type of services (medical, dental, family services)

iii) Concentration of utilization of services

iv) Type of provider
   a) profession (doctor, nurse, aide)
   b) skill level (skill required to perform function)

v) Degree of capital intensity of services

4. Data

a) Output Data

Data on health status output as defined in this study (i.e. role fulfillment) have not been collected by the Health Center. It was, therefore, decided to collect this information directly.

b) Input Data

Data on health services inputs were collected by the Health Center. The storage of these data on computer tapes promised to make the handling of input variables a simple task. Yet, an examination of the collection procedure revealed a series of shortcomings.

c) Limitations of Input Data

(i) Continuity of selection (all data).
The data collection system has been effective only since 1969 and has been reorganized twice since then (April 1970 and July 1971). This reporting period is most likely too short for evaluating the impact of health services.

(ii) Accuracy of reporting (Medical and Family Services data). The following discussion refers mainly to the collection of data by the family services department and by the medical department. Records of the dental department seem to be more accurate and more complete.

The author feels that the reporting system attempts to get too much information from too many people. A short description of the data collection process should clarify this statement. Every patient-provider contact is recorded

in the following manner: a) personal information, b) eligibility status (payment), c) reason for visit and d) services received. Especially information items (c) and (d) are of interest to this research. Yet, an examination of the collection process reveals that this information suffers from serious inaccuracies.

Most services are performed by teams of doctors, nurses and aides but usually only one provider is listed. Also, only one or two types of services rendered are reported, even if patients receive several types of services. Similarly, only one or two reasons for visits are listed although many patients are treated for a variety of ailments. A different problem arises because of privacy and confidentiality. An investigation on family planning data revealed that several doctors do not report services connected with family planning because they know that this information (in connection with a specific name) will pass through the hands of various nurses and aides before it becomes an anonymous statistical entry. The problem is aggravated by the fact that most employees preparing the data are members of the projects indigent target population.

d) Suggestions for Improvements of Input Data Collection (Medical and Family Services Records)

A few improvements of the collection process should be recommended here:

(i) Simplification of collection forms. The Michigan Department of Public Health (MDPH, Center for Health Statistics)

is presently engaged in accomplishing this task. Teaching the utilization of the new forms will contribute to a reduction in inaccuracy.

(ii) Sampling. Even with new forms, it will be impossible and/or costly to fill in all details of the visit as called for by the data form. A sampling procedure would reduce the number but increase the accuracy of reported data. Experiments are needed to guide the sampling method. (Every twentieth patient, or patients with particular characteristics, etc.)

(iii) Task Analysis. The present data system only sketches what the various providers do and whom they serve (e.g., phone calls about the use of prescribed medications are almost never recorded, but consume a considerable amount of the working hours of some providers). A task analysis is the only reliable procedure to analyze the performed functions.

(iv) Consolidation of records. In addition to the information required for the computerized reporting system the medical department collects and stores so-called "patient files." Information for "patient files" is collected separately and causes additional work. Since doctors rely on "patient files" for their diagnosis they tend to make their entries complete and accurate. Organizing "patient files" in such a way as to permit their use in establishing the statistical records would reduce the burden and increase the accuracy of collection.

(v) Problem oriented charts. One way to reorganize "patient files" is by adopting the "problem oriented chart" which bases the report on the problems as perceived by the patient and not on the doctor's diagnosis.[10] Thus, the chart lists "cannot bend over" and not the diagnosis of this problem. It is interesting to point to the similarity between the "problem oriented chart" and the "role fulfillment indicator" which has been advanced in the methodological part of this thesis.

5. With/Without and Before/After: The Problem of Experimental Design

Chapter III emphasized that a project evaluation can only be achieved by a "with and without" analysis and not just by "before and after" analysis. The"with and without" analysis specifies clearly what amount of output was produced by the project inputs. The "before and after" analysis only indicates that outputs have or have not changed since the project took effect but it does not identify the specific causes for this change. The "with and without" comparison utilizes the methodology of experimental design by isolating specific input-output relationships.

The characteristics of an experimental design are control and random selection.[11] The design will usually consist of (i) stratification of the population to be treated according to relevant variables which are measured and known before sampling, (ii) classification of the

sample according to relevant variables which are measured after sampling, and (iii) assurance of random occurrence of relevant variables which could not be measured either before or after sampling. Different situations require different steps to achieve a controlled experiment.

The major obstacle to a "perfect" design is the limited ability to classify or stratify the population according to relevant characteristics. Relevancy is determined by the influence which these characteristics can have on the effect of the treatment. Put differently, these relevant (but unmeasurable) characteristics act like "inputs" (or independent variables) on "outputs" (or dependent variables).

In the case of health evaluation research we face the problem of not being able to adequately identify the population. Physiological and mental states are relevant variables and influence the outcome of the treatment. Comparing the health status output of individuals with different treatment levels would not be a proper analysis without accounting for differences in health status due to different physiological and mental states at the outset of the "experiment."

One way to overcome the difficulty of classifying individuals by their physiological and mental states is to make sure that those states are equally represented in the control and treatment groups. This can only be achieved indirectly by selecting the control and treatment groups at random from a parent population. The random selection

of these groups will assure an equal distribution of physiological and mental states, but it will not always assure a completely controlled design. Only by randomly applying treatment to the individuals within each group we can be sure of such a control. This might seem to be a redundant requirement in the case of most physical experiments. Yet in the case of health care it will be often difficult to treat all individuals within a particular treatment group exactly alike. If it is impossible to give accurately defined treatment to accurately defined treatment groups it is necessary to avoid self selection of treatment caused by unknown criteria (of providers and clients) which could not be included in the analysis. The best way to achieve this is by random application of the treatment.

The procedure as described in the preceding paragraph seemed to be infeasible because of time, administrative policies and resource constraints. It was, therefore, decided to resort to a second-best approach. This approach involved selecting a "comparison" (control) group which resembles the treatment group in a variety of relevant criteria.[12] Criteria were considered relevant when it could be assumed that they would either be associated with or have an influence on physiological and mental states. It was assumed that variables such as income, employment and degree of industrialization were relevant ones. Yet there was no assurance that the chosen variables were

sufficiently capable of classifying the two populations into identical groups. Therefore, there was no assurance that health services in the control and treatment counties were not "selective" in their treatment of particular individuals. Further experience and better theories might advance the "art" of detecting and isolating this bias.

6. The Problem of Observation Over Time

Most of our public projects are productive over a long period of time. In the case of health projects and additional feature emerges: Health projects have a long "gestation period," i.e. it takes a long time to produce any benefits at all. On the other hand if administrators want to know how certain output indicators "behave" they do not want to wait until "time shows the results." Yet administrators will have to learn to live with this characteristic of the product "health." The only way how the "waiting time" can be somewhat reduced is by developing sensitive indicators and by employing designs which establish accurate cause-effect relationships.

7. Evaluating the Lake County Health Center

Many requirements for an ideal design were not met in the Lake County case. Baseline information on role fulfillment indicators was in existence only in terms of school attendance records of the local school. Physiological and mental states of the pre-Center period was available to some degree in the form of the medical and dental records of

clients taken at the time of enrollment in the project. Yet, only elaborate efforts would have permitted an inference of classes of physiological states as called for by the preceding sections. Without a basis for classification of physiological states it was impossible to evaluate the impact of different treatment levels. It was equally impossible to evaluate the impact of similar treatment levels on different classes of physiological states.

The amount and quality of information made only second-best procedures feasible. It was decided to experiment with two approaches. One was to apply the format of an "ad-hoc comparison" of the Lake County population with a population from another county. The other was to analyze the impact of the Health Center on school attendance by examining school attendance records of the Baldwin area school system.

a) An Ad Hoc Comparison

It became apparent that the only way one could establish a control comparison population for the individuals treated by the Health Center was by identifying a comparable population which lived in conditions similar to those of the Lake County population during the past several years but did not succeed in getting a health project of the Lake County type. It was decided to use economic and demographic criteria for selecting such a population. Data on the quantity and availability of area-wide health services were assumed to assure that the comparison group had received the same amount and quality of health care as the treatment

group would have had without the availability of the Health Center. Once the two groups were established it was possible to administer questionnaires to a particular section of the two groups. The survey produced indicators of health status which were used to establish the impact of the Health Center. A detailed description of this method follows in Chapter V of this study.

b) School Attendance Records as Indicators of Role Fulfillment

Since these were the only available output data describing both the pre-Center period and the with-Center period it was decided to investigate their usefulness for a health status evaluation. A description of this research is offered in Chapter VI.

FOOTNOTES

1. Manistee County: Economic Trends, Suggestions for the Future, Reports of Class Projects of Resource Development 816 (Michigan State University, Spring Term, 1965). (Mimeographed.)

2. Mason County Overall Economic Development Committee, Overall Economic Development Program, (Grand Rapids, Michigan: Williams & Works, 1966).

3. Lake County Planning Commission, Lake County: Comprehensive Area-Wide Plan for Water & Sewer Service (Grand Rapids, Michigan: Williams & Works, 1971).

4. Newaygo County Community Development, Committee Report, 1967. (Mimeographed.)

5. John Malcus Ellison, A Social and Economic Study of the Negro Problem in Lake County, Michigan (Lansing, Michigan: Land Use Planning Section, Resettlement Administration, Region II, 1936). (Mimeographed.)

6. John Malcus Ellison, op. cit., p. 7.

7. Office of Economic Opportunity, Comprehensive Health Services Projects: Summary Report (Washington, D.C.: Office of Health Affairs, Planning and Evaluation, Second Quarter, 1971).

8. Office of Economic Opportunity, Study to Evaluate the OEO Neighborhood Health Center Program at Selected Centers, GEOMET Report No. HF-71 (Washington, D.C., 1972), pp. iii-vi.

9. S. Katz, et al., "Progress in Development of the Index of ADL," Gerontology, No. 10 (1970), pp. 20-30.

10. The author was introduced to this concept by Dr. David Nielson of the Western Michigan Comprehensive Health Services Project, in Baldwin, Lake County.

11. F. B. Baker, "Experimental Design Considerations Associated with Large-Scale Project," Improving Experimental Design and Statistical Analysis, edited by J. C. Stanley (Chicago, Illinois: Rand McNally, 1967), pp. 206-56.

12. Houston recommends the term "ad hoc comparison" for this approach. He points out that in such a situation the term "comparison group" is preferred over the term "control group" because the latter implies that there is sufficient control, a condition which is not guaranteed in an "ad hoc comparison." See Tom R. Houston, Jr., "The Behavioral Sciences: Impact-Effectiveness Model," Evaluating Social Programs: Theory, Practice, and Politics, edited by Peter H. Rossi and Walter Williams (New York: Seminar Press, 1972), pp. 51-65.

CHAPTER V

IMPACT OF HEALTH CENTER:
METHOD I, VARIOUS OUTPUTS

Chapter IV pointed out the problems of designing a health project evaluation in a way which would facilitate a "with" and "without" analysis. It was pointed out that, because an ideal experimental design seemed infeasible, second-best alternatives had to be explored. This chapter employs a design called an "ad hoc comparison." Houston describes this procedure as follows:

> "Here units who were exposed to a program are compared to units who were not, and differences are interpreted as program effects. This procedure may be refined by selecting the comparison group (it is misleading to call this a control group) in such a way that it resembles the program group in various respects." 1

This study concurs with Houston that the lack of random assignment to the two groups is a basis for misinterpretation of the results due to bias introduced in selecting the comparison group and because of the inability to control the treatment of the units within each group. But despite its flaws it is believed that this design (or modifications of it) is economically and practically more feasible than designs which meet the requirements of experimental designs more closely. Since "better" designs seem to be infeasible, empirical research has to concentrate on improving "imperfect" designs. The objectives of this chapter are, therefore,

oriented more towards gaining experience with an imperfect methodology and not towards producing "hard facts."

1. Selection of the Comparison County

The following variables were considered to have an effect on the health related characteristics of individuals: (i) climate, (ii) distance from metropolitan areas and industrial centers, (iii) average income in the area, (iv) incidence of poverty, (v) availability of health care. To eliminate climatic variables it was decided to concentrate on Northern Michigan. To establish comparability in terms of degree of industrialization only rural counties were considered.

Census information and other publications were utilized in investigating socio-economic conditions of northern Michigan counties. No formal procedure was employed in selecting a comparison county. Discussions with State Officials and M.S.U. extension personnel and an examination of available data established that of all northern Michigan counties, Montmorency county comes closest to Lake County in terms of (a) total population, (b) nonfarm - farm population ratio, (c) rural-urban population ratio, (d) degree of industrialization, (e) distance to metropolitan areas, (f) personal income, (g) incidence of poverty, and (h) until 1967, supply of health services. Available data indicated only two major differences between the two counties. (i) Lake county has a large black minority; 23 percent of Lake county's residents

are black. (ii) Since 1968, Lake county's supply of health services had been significantly larger than that of Montmorency county because of the establishment of the OEO Health Center in Baldwin. Appendix Tables B2, B3, and B5 present a summary of the most significant indicators used for the selection of the comparison county. The map in Figure 5 shows the location of Lake county and Montmorency county and describes poverty conditions throughout the State of Michigan.

The statistical similarity between the two counties forms the basis for the following assumptions underlying the ad hoc comparison.

(i) Montmorency county and Lake county were "identical" counties until 1968.

(ii) The two counties would have had continuing identical development if Lake county had not received the OEO Health Center in 1968.

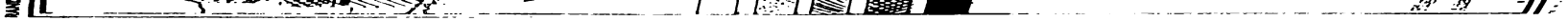
(iii) The difference in development since 1968 is attributable exclusively to the actions of the Health Center.

(iv) The population of the two counties is identical with the exception of their access to health services.

(v) Montmorency county is a "simulation" of Lake county in its "without the Health Center" state.

2. Selection of the Comparison Group--Scope of Investigation

The main task of the analysis was to compare the health status of Lake county residents who were eligible for the Health Center's services with Montmorency county residents



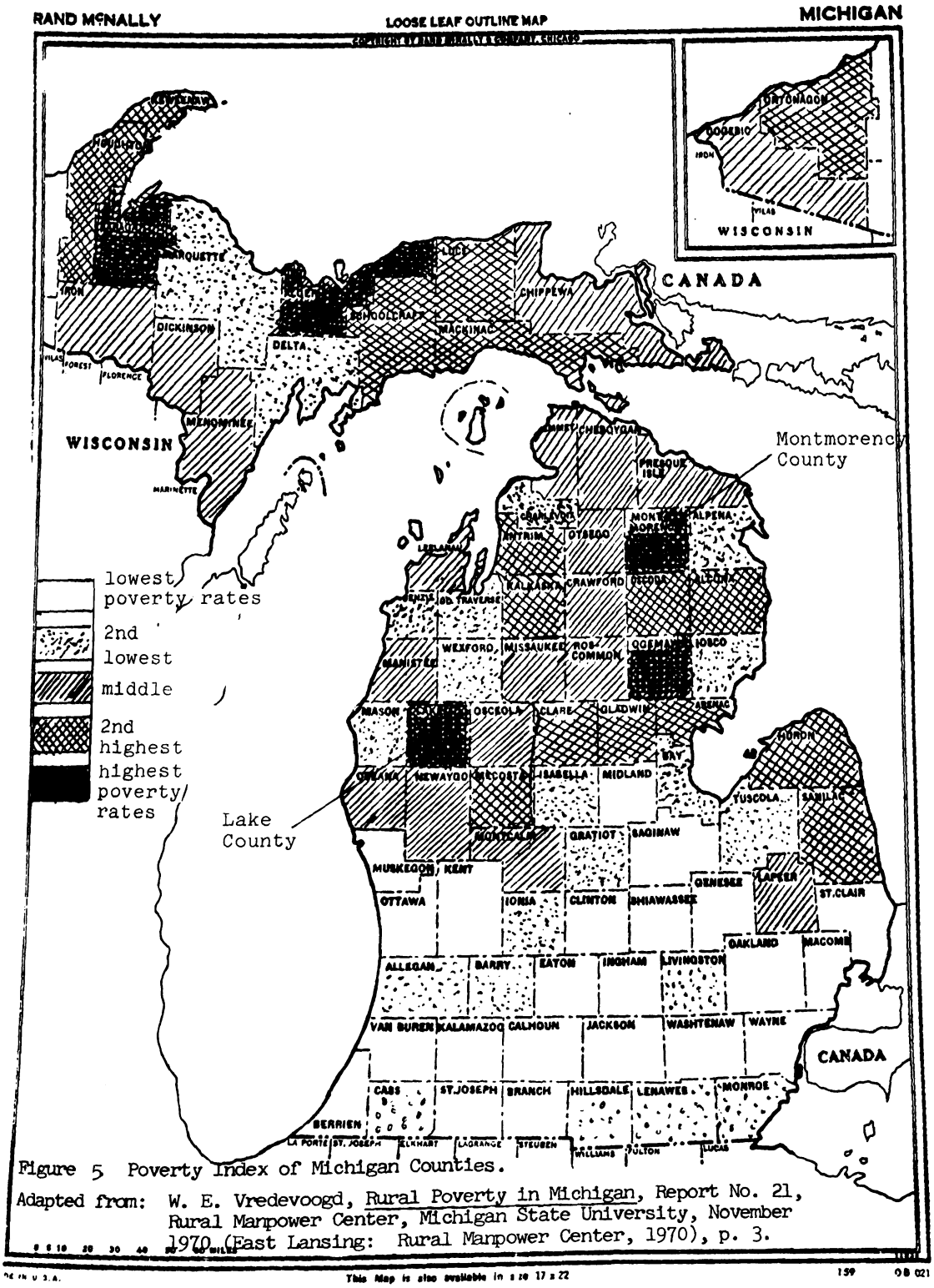


Figure 5 Poverty Index of Michigan Counties.

Adapted from: W. E. Vredevoogd, Rural Poverty in Michigan, Report No. 21, Rural Manpower Center, Michigan State University, November 1970 (East Lansing: Rural Manpower Center, 1970), p. 3.

who would be eligible if they were living in Lake county. Since resource constraints and the lack of an easily obtainable sampling frame precluded a sampling of the total eligible population it was decided to limit this investigation to a portion of the total eligible population. The sampling frame consisted of those residents who were receiving food stamps (in Lake county) and Governmental Surplus Commodities (in Montmorency county). This procedure assumed that both food stamps and Commodity recipients were a representative sample of the population eligible for the Health Center's services. This assumption seemed to be especially warranted in light of the fact that the eligibility criteria for free care in the Health Center in Lake county are similar to the guidelines establishing eligibility for participation in the Commodity and food stamp programs. Appendix Table B6 summarizes the income eligibility criteria for OEO programs, food stamp and Commodity programs.

3. The Model

The analysis of the health production process followed the framework of a regression analysis specifying

$$H = f(HS, O)$$

where H = health status (dependent variables), HS = health services inputs (independent variables), O = other variables influencing health (independent variables).

a) Dependent Variables

The objectives of this study were to concentrate on the identification and measurement of relevant output

measures of health projects. As indicated in the preceding chapters, the following "role fulfillment indicators" were specified as dependent variables of the analysis:

i) days missed from work because of health related reasons

ii) days when health conditions prevented the individual from his usual work at home

iii) days missed from school because of health related reasons

iv) days when health conditions prevented children from their usual play.

Additionally, it was decided to experiment with a measure of perceived health status, resulting in three additional dependent variables:

(v) perceived health status in 1968

(vi) perceived health status in 1971/72

(vii) perceived change of health status 1968-1971/72.

The main reason for this measure was that it related "before" Health Center years with "after" Center years.

b) Independent Variables (Health Services Inputs)

The conceptual models of Chapter III provided for several classifications of inputs. Yet, the lack of base line data precluded the application of any of the classification schemes in the actual analysis.

(i) Residence (X1 in aggression analysis). The major health services variable was, therefore, represented by being in the "treatment county" or in the "comparison county." To further differentiate this dichotomy it was decided to include additional variables which

hypothetically could have determined the type and amount of care. Because of the character of the data, most of the selected variables were expressed as dummy variables. The selected variables are listed next. (A detailed discussion of these variables is offered under section d.)

(ii) duration of residency in project area

(iii) enrollment in Health Center

(iv) use of preventive services

(v) desire for additional health services.

c) Independent Variable (Other Variables Influencing Health)

To isolate effects on health status which might have been caused by variables which were unrelated (or not directly related) to the available health services, the following variables were included in the analysis. (A discussion of the variables can be found under section d.):

(i) public assistance status

(ii) race

(iii) perceived change in income

(iv) education of head of household

(v) sanitary facilities

(vi) nutrition

d) Justifications for the Choice of Independent Variables

Duration of Residency in Project Area. (X4 in regression)

It was assumed that in order to have a "chance" to make use of the Health Project a person had to reside in the area for at least a year. Individuals who had moved into the area less than 12 months before the interview were eliminated from the interview. Since "chance" is a function of time the sample was further divided into those who have

resided in the area for longer than five years and those who have lived in the area between one and four years.

Enrollment in the Health Center (XII in regression)

Only 75 percent of the Lake county households receiving food stamps were listed as enrolled in the Health Center's records. It seemed therefore necessary to classify the Lake county sample into two groups--one which was enrolled in the Health Center one year prior to the interview (Fall 1971) and one which was not enrolled at that time. It was, therefore, assumed that only enrollment of one year or longer could have had any impact on the client's health. Individuals who were not enrolled in the Health Center could not be eliminated from the sample because it was impossible to eliminate comparable individuals in the comparison group who would not enroll in a Health Center even if it were available to them.

Use of Preventive Care (X12, X13 in regression)

Since one of the most important aspects of modern health care is the availability and utilization of preventive care it was decided to find out whether presence or absence of preventive care has any impact on health status. Although many administrators consider the utilization of preventive care as the output of their projects, it was treated as an input in this study.

Desire for Additional Health Services (X8 in regression)

Preliminary investigations revealed that residents of both counties differed widely in their desire for additional

health services. Although no particular hypothesis was established it was decided to include satisfaction with the available care as a criterion for stratification.

Public Assistance (X3 in regression)

Since both food stamp and Commodity recipients are composed of families who receive other forms of public assistance (ADC, Medicaid, Medicare, etc.) and of families who do not receive any form of public assistance it was decided to differentiate the sample into those two groups. The two groups represent different income levels within the eligible population. This stratification helped also in isolating the effect of "financial access" to health services from the effect of "physical access." This isolation seemed necessary because it was hypothesized that someone meeting public assistance income guidelines would get at least financial access to health services via Medicare or Medicaid, even without the Health Center, while those just above the Public Assistance income guidelines would not have this option. Of course, without a Health Center both groups suffer from a lack of "physical access" to health care.

Race (X2 in regression)

Lake county has a large black minority (23 percent of Lake county's residents are black) while there are no black residents in Montmorency county. To isolate racial differences it was decided to separate the Lake county sample into a "black" and a "non-black" group.

Perceived Changes in Income 1968-72 (X9 in regression)

This variable was chosen as a proxy measure for changes in real income. Again, it is emphasized that a change in real income would be one of the "intermediate" outputs of the OEO Health Project which should be studied separately as a dependent variable. This analysis treats real income changes as independent variables.

Education of Head of Household (X14 in regression)

The level of education is of considerable importance in determining a person's health.[2] This study stratified the population into one group which consisted of families where the head of the household had eight or fewer years of schooling and into another group where the head of the household had nine or more years of education.

Sanitary facilities and heating (X5, X6 in regression)

Epidemiological studies have established a relationship between the health status of a population and the presence or absence of certain environmental conditions.[3] Although both counties did not report any water borne diseases it was decided to stratify the sample according to the availability of sanitary facilities. It was believed that sanitary conditions might serve to capture socio-economic conditions not represented in the other income related measures. Similar considerations led to the inclusion of home-heating as a variable for stratification.

It should be emphasized that the improvement of both home-heating and sanitary facilities are explicit targets of OEO Health Centers. They are "intermediate" outputs of the Health Center, if one uses the language of Chapter II of this paper. It would be advisable to make an additional evaluation of the Health Center's impact on heating and sanitary facilities. The present investigation limits itself to treating home-heating and sanitary facilities as input (or explanatory) variables.

Nutrition (X7 in regression)

As in the case of heating and sanitary facilities, changes in nutrition were considered as explanatory variables not affected by the Health Center.

e) Methodological Problems

A look at the variables indicates that they describe a situation which could be summarized as the socio-economic condition of the families interviewed. The growing awareness of the importance of these variables in determining health status was the main reason for their inclusion as separate variables.

There are, however, methodological problems connected with a procedure which treats these variables as exogenous: One of the prime objectives guiding the establishment and administration of OEO Health Projects is directed towards the explicit change of these "environmental" variables. A change of the variables in the desired directions is therefore an output of the OEO project. A comprehensive evaluation

would have to include an analysis of these "intermediate" outputs and relate them to "ultimate" outputs of health status. Resource and time limitations forced this study to concentrate mainly an identifying and measuring the impact of the Health Center on "ultimate" outputs (i.e. changes in health status) and to treat "intermediate" outputs as exogenous variables.

4. Survey

The lack of applicable data necessitated the development of a survey instrument which would facilitate collecting the desired data. The current survey literature guided the procedure for administering the total survey (Kish,[4] Lansing and Morgan,[5] Moser[6]). The methodological series of the National Center for Health Statistics served as a guide to surveying problems in the health and health services area.[7]

a) Survey Instrument

The survey instrument consisted of a questionnaire which evolved out of an iterative process consisting of numerous feedbacks from staff members of the Michigan State University, of the Michigan Department of Public Health and of the Western Michigan Comprehensive Services Project. Two pilot surveys helped to make the instrument applicable to actual use.

Since part of the information pertained to the total household and was the same for every household member, it was decided to divide the survey instrument into two parts:

(i) Household questionnaire and (ii) Member questionnaire.

b) Sampling

Procedural Alternative Considered

One alternative is a simple random sample from a sampling frame and an interview at the family's residence. The Social Services Departments of both counties offered cooperation in establishing a list of families receiving food stamps and Surplus Commodities, respectively. During the month of the interview (September 1972) the Lake County Social Services Department distributed food stamps to 134 families (403 individuals) who did not receive any other form of Public Assistance (referred to as NA--Not Assistance clients) and to 179 families (486 individuals) who received other forms of Public Assistance (PA clients). The Montmorency County Social Services Department administered during the same month the distribution of Surplus Commodities to 162 NA families (423 individuals) and to 76 PA families (201 individuals).

A random sample of 50 clients could have been drawn in each county but a pilot survey with another sample indicated that most of the families were extremely difficult and costly to locate and lived far apart. When it turned out that the refusal rate was rather high (i.e. twenty percent refused to answer any questions), it was decided to use a different procedure.

Procedure Applied in this Study

Food stamp and Surplus Commodity recipients were asked

to volunteer the desired information at the time they picked up their stamps or commodities, respectively. Since most clients tend to pick up their food stamps during the first few days of the month and since commodities are delivered at three specific days, it was decided to interview both NA and PA clients and to interview willing clients who were next in the waiting line when the interviewer had an opening.

c) Interviewing

Interviews in Lake county were conducted in offices of the Social Services Department in Baldwin on September 5, 6 and 7, 1972. The interviews were handled by the author and two Graduate Assistants of the Department of Agricultural Economics at M.S.U. on September 5. On September 6 interviewing was done by the two Graduate Assistants and on September 7 by the author alone. One interview lasted for approximately 5 to 20 minutes. Eighty four household interviews were completed. The refusal rate was zero.

In Montmorency county it was necessary to interview the heads of the households (or their spouses) while they were sitting in their cars waiting to receive the Surplus Commodities. Interviews were conducted at three different locations: Atlanta (on September 1), Hillman (on September 6) and Lewiston (on September 8). All interviews were conducted by the author and lasted between 5 and 15 minutes. Here too, 84 household interviews were completed. Two individuals (one male, one female) refused to answer the

the questionnaires.

The interviews consisted of two parts. First the respondent was asked to answer a Household Questionnaire which was applicable to all members of the household. Then he was asked to answer health related questions for himself and all other members of his household. The interviewers read the questions to the respondents and entered the responses into the appropriate places on the questionnaire. Respondents were the heads of the households or their spouses. No provision was made to differentiate between kinds of respondents.

5. Household Questionnaire

The household questionnaire was designed to take stock of the socio-economic conditions of the surveyed families. A copy of the questionnaire is presented in Appendix C. Question (c) established the duration of residency in the county. Questions (d-g) were included to discover whether there was a difference in mortality and institutional confinement between the two populations. It was impossible to detect any differences in the analysis--mainly because of the low frequency of responses. Yet, an inclusion of this question is important in a large scale investigation: By excluding this information it would be possible for an area which has a low health status but sends all its sick people into institutions to show a higher aggregate health status than an area which has not such a low health status but

treats all its sick people at home.

Question (d) served also to test claims that families attract distant relatives (grandchildren, nephews, nieces, etc.) because of the availability of free health care. The small sample, however, did not warrant an actual test of this hypothesis.

Questions (h-w) helped to obtain information on independent variables called for by the model. In spite of the pilot surveys, it became clear during the interview that not all questions were equally well suited for obtaining the desired information. For instance, questions (h-l) resulted in unambiguous answers by all respondents. Question (m), on the other hand, which asked respondents for improvements in heating was perceived differently by different people. Many respondents volunteered that their home heating is "better" because they got newer equipment. Only a few respondents explained that their house is actually warmer during the winter. Question (o) proved to be insufficient in describing changes in nutrition. Older people tended to eat less, younger people ate more. Using the word nutrition directly, question (p) seemed to be more suitable for expressing changes in nutrition. Questions (r and s) asked to assign a rank to the quality and availability of health care in the area. It was interesting to observe that respondents who were older than 35 years had considerable greater difficulty in grasping the concept of a continuing scale for the availability of health services than those

below 35 years of age. A difference in education is suggested as the reason for this difference. Additionally, very few people could specifically answer question (s) which asked to identify reasons for changes in health care. (The question was asked to indicate what the respondents thought had influenced the availability of care in the area.)

6. Member Questionnaire

The respondent (head of the household or spouse) answered first the Member Questionnaire for himself and subsequently for all the members of his family. The numbering system and specific statements guided the interviewer to the appropriate position in the questionnaire. A copy of the questionnaire can be found in Appendix C.

Subjective Evaluation of Health

Questions (1-3) asked for a subjective evaluation of the respondent's health between 1971-72 and 1968, where the respondent's health status could be marked on a scale consisting of six positions. Older respondents here, too, had greater difficulties in assigning a numerical value to a concept than did younger respondents.

Preventive Care

All respondents were certain in answering questions (4-7) for themselves, yet, male respondents had considerable problems in remembering doctor and dentist visits and other health related events of their children and wives. Questions (8-11) were inserted to introduce the concept of disability into the respondents' thinking. No further use

was made of these questions in the analysis because of the lack of complete and consistent answers.

Disability and days missed because of health.

Question (12) checked for total disability and the need for constant attention. Questions (14-17), (19-22), (34-36,42) and (38-41) followed a common pattern of identifying first the "chronic disability status" of an individual and then the days he/she could not perform his "role" as determined by his chronic disability status. Chronic disability was identified in terms of the individual's ability to perform major activities (roles) which were relevant to his age. The relevant role for children between ages 0-5 was to play "as usual." The relevant role for children between 6 and 17 years of age was to go to school and play "as usual." Adults between 18 and 65 are supposed to work "as usual" and to perform home work "as usual." Retired people past 66 have their role specified as being able to work around the house "as usual."

The first question of each group (14, 19, 34, 38) identified whether the individual was totally limited in performing his/her major role. The second question (15, 20, 35, 39) established whether the individual was limited in the kind of major activities. The third question (16, 21, 36, 40) checked whether the individual was limited in the amount of role fulfilling activities. An individual could be assigned to only one limitation class within a particular activity group. (Individuals who needed total

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care were already identified in question (12).) The fourth question of each group (17, 24, 42, 41) determined the number of days an individual missed from his "usual" activities as identified by the chronic disability categories.

The previous procedure of establishing chronic limitations first and then identifying the days missed for each limitation class followed the procedure used in one section of the Health Interview Survey.[8] The Census Use Study Report No. 12 indicates the application of this procedure to the New Haven (Connecticut) Census Use Study.[9]

In interviewing the respondents it could be observed that the respondents who were clearly in one particular limitation category had no problem in identifying themselves with the role limitation as described. Yet, individuals who had only recently been forced into a more severe level of limitation had difficulties in classifying themselves. Examples are injured veterans, people in retirement, individuals who survived severe diseases.

Despite these limitations it was felt that the framework as presented offers a viable methodology for classifying long term limitations in terms of a "role-fulfillment indicator."

Employment status

Questions 22-33 served to separate unemployment due to health conditions from unemployment due to conditions in the labor market. Furthermore, these questions attempted to put the number of days missed from work because of health reasons into a relationship to the number of days on which the

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individual was actually employed. The month by month procedure was time consuming, yet forced the individual to concentrate on his employment for the last year. A check between the answers to questions (27-31) and the answers to question (32) proved to be completely inconsistent. Respondents tended to associate full time with a "full working day" (8 hours) and not with a full working year. This suggests that the time consuming breakdown by months, weeks and days was necessary to define the work opportunity in relation to the days missed. The apparent confusion on what constitutes "full time" employment resulted in inconsistent responses to question (33) which attempted to identify a change in the amount of employment. Therefore, question (33) was not treated in the analysis.

7. Analysis

The collected data were coded and stored on computer tapes. Calculations were handled on computers of the Michigan State University Computer Center. The analysis of the data was divided into the following steps: a) profile of sample households, b) distribution of activity limitations, c) average numbers of days lost from role fulfillment, d) work opportunity unrelated to health vs. work days missed, e) regression analysis of days lost from role fulfillment, f) perceived availability and quality of local health care, g) perceived health.

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a) Profile of Sample Households

Appendix Table B7 offers a profile of the sample households and only a few remarks are needed here. It appears that most characteristics are evenly distributed among the two counties. The Lake county sample, however, consists of more Not Assistance (NA) clients (70%) than the Montmorency sample (58%). Furthermore, there are no black residents in Montmorency while 44% of the Lake county sample are black. It is interesting to note that NA clients have lived longer in the area than public assistance (PA) clients (Section 3 of Appendix Table B7).

Section 6 of Appendix Table B7 indicates that in Lake county 50 percent of the sample reported an improvement in their families' nutrition which contrasts with 32 percent of the Montmorency sample. An unexpected result is shown in section 7 of the table. Fifty four percent of the Lake sample would see a doctor more often if they had more income or if doctor services were more readily available. This contrasts with 44 percent of the Montmorency sample. This result is surprising in the light of the greater supply of medical services in Lake county. Yet, it points out that Montmorency residents feel that they get medical attention even without the presence of a health center of the size of the Lake county project. On the other hand, it is possible to interpret this result as reflecting the greater awareness of need for health care of the Lake county sample.

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The heads of households had a lower level of education (9.1 years completed) in Montmorency than their Lake counterparts (9.9). Interestingly, the heads of families who were on public assistance had in all cases more years of education than the heads of families who were not on public assistance (Section 10, Appendix Table B7).

b) Distribution of Activity Limitations

Respondents were asked to classify themselves and the members of their families into five limitation groups. Group 1 consisted of individuals who needed help to move around inside or outside the house. Group 2 was composed of individuals who could not fulfill their activity (play, school, work, homework) because of health reasons. Those who were limited in the kind of activities they could perform formed group 3. Individuals who were limited in the amount of activities were assigned to group 4. Group 5 consisted of individuals with no limitations at all. Thus group 1 represented the cases with most severe activity limitations while group 5 included those who had no (or no reported) limitations.

Question 11 of the Member Questionnaire (see Appendix C) helped to assure that limitations classification referred to periods which have been in existence for more than six months. It is suggested to improve the accuracy of this information in further studies by asking for the duration of the limitation after a limitation state has been established. Table 1 presents the relative frequency distribution

Table 1. Relative
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County / Activity limitation	
1=needs help to move around	
2=cannot fulfill activity	
3=limited in kind of activity	
4=limited in amount of activity	
5=no limitations	

a The percentages we
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Table 1. Relative Frequency Distribution of Individuals in Different Activity Limitation Groups[a]

Activity Limitation \ County	Lake	Montmorency
	Percent	
1=needs help to move around	1.2	0.6
2=cannot fulfill activity	6.9	6.0
3=limited in kind of activity	18.5	11.7
4=limited in amount of activity	4.5	7.0
5=no limitations	68.5	74.5

[a]The percentages were obtained by adding up corresponding groups of activity limitations of all roles (play, school, work-job, work-no job, homework) and establishing percentages. The absolute numbers upon which this calculation is based are shown in Table

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The table indicates that the Lake County sample had more severely limited individuals (group 1, 2, 3) than the Montmorency sample and fewer unlimited (or less severely limited) individuals. Table 2 presents the absolute number of individuals in the various activity limitation groups. Individuals between zero and five years of age and above the age of sixty five report only on a single activity (play and homework respectively) while school children and individuals of age eighteen to sixty five report on two activities (play-school and work-home work respectively).

The discussion, up to this point, treated limitation classes as descriptive variables of the population. Yet, it is obvious that one of the long-run outputs of health care is the reduction of limitations. This study does not treat differences in limitations as outputs because of the short duration of the evaluated project and because of the small sample size. A treatment of the conceptual problems introduced by changing roles is offered in Chapter VII of this study.

c) Average Numbers of Days Lost From Role Fulfillment

To isolate influences of age and major activity on the number of days lost from role fulfillment it was necessary to base further steps of the analysis on age and activity groups. Additionally, it was decided to investigate how the number of days lost varied between limitation groups.

Table 2. Number of Individuals by Age and Activity Limitations--A Comparison Between the Lake County and the Montmorency County Sample[a]

Activity	Age / Activity Limitations	LAKE					MONTMORENCY				
		0-5	6-17	18-65	66+	All Ages	0-5	6-17	18-65	66+	All Ages

Table 2. Number of Individuals by Age and Activity Limitations—A Comparison Between the Lake County and the Montmorency County Sample[a]

Activity	Activity Limitations	LAKE Age 0-5	6-17	18-65	66+	All Ages	MONTMORENCY Age 0-5	6-17	18-65	66+	All Ages
PLAY	1		1			1					
	2										
	3		1			1		4			4
	4		2			2		3	1		4
	5	37	83	2		122	36	85	1		122
(1)Total:126		37	87	2			Total:130	36	92	2	
SCHOOL	1										
	2		1			1					
	3		2			2		2			2
	4								2		2
	5		84	2		86		90			90
Total:89			87	2			Total:94		92	2	
HOMEWORK	1		1	2	2	5			2	1	3
	2		3	1	2	6		5	4	2	11
	3			33	29	62			20	13	33
	4			12	4	16			14	4	18
	5			55	8	63			71	10	81
(2)Total:152			4	103	45		Total:146		5	111	30

Table 2. Continued

Activity	Activity Limitations	Age	LAKE					MONTMORENCY				
			0–5	6–17	18–65	66+	All Ages	0–5	6–17	18–65	66+	All Ages
		1										
		2										

Table 2. Continued

Activity		Activity Limitations[a]	LAKE Age 0-5	6-17	18-65	66+	All Ages	MONTMORENCY Age 0-5	6-17	18-65	66+	All Ages
		1										
		2										
	Have	3			15		15			9		9
	Job	4			1		1			4		4
		5			26		26			38		38
WORK												
		6			26		26			18		18
	Have	7			7		7			8		8
	No	8			2		2			6		6
	Job	9			25		25			28		28
	Total:102				102			Total:111		111		
Total Number of Individuals (1)+(2)[b] 278								276				

[a]Activity limitations should be interpreted as follows: 1=needs help to move around, 2=cannot fulfill activity, 3=limited in kind of activity, 4=limited in amount of activity, 5=no limitations, 6=has no job and cannot fulfill activity, 7=has no job and is limited in kind of activity, 8=has no job and is limited in amount of activity, 9=has no job and has no limitations.

[b]The total number of individuals are calculated by adding individuals in the play-group to individuals in the home work group.

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Table 3 displays in columns 4 and 5 the average number of days lost from role fulfillment for Lake county and Montmorency county, respectively. Rows 4, 8, 12, 16, 20, and 24 show the values for the age-activity groups regardless of limitation. Lake county individuals experience fewer days lost from role fulfillment in all but the work group (age 18-65, row 20). The other rows display days lost from role fulfillment for the various limitation groups. Here, too Lake county individuals miss fewer days than their Montmorency counterparts. (Exceptions are rows 9, 14, 17 and 21.)

d) Work Opportunity Unrelated to Health vs. Workdays Missed

As previously stated, it is necessary to analyze days missed from work in light of work opportunities unrelated to health. A computation of days employed indicated that Lake county individuals of age 18-65 were employed for considerably fewer days during the year (137 days) than Montmorency county individuals (193 days). It should be emphasized that the concept of work opportunity days excluded "unemployment because of health." (Health related unemployment was counted as days lost from work activities.)

The fact that Lake county individuals have fewer work opportunity days and additionally miss more work days because of health (17.1 days) than Montmorency county individuals (8.6 days, see row 20 of Table 3) should be recognized by relating work opportunity to "days missed from work because of health." One way to accomplish this is by

1 Recreation Location	2 Age and Activity	3 Limitation	4 Mean Lake Area Values	5 Mean Recurrency Area Values	6 IC	7 Constant	8 X1 County 1=Lake 0=Kent.	9 X2 Ambient Lake Ave. 0=Tud. Ave.	10 X3 Hemis. 1=1_Yrs + 0=1_Y yrs	11 X4 Gen. Lim. All Dan.	12 X5 Heat 1=Heat Up 0=Heat Not Up	13 X6 Nutrit 1=Nutrit. Up 0=Nutrit. Up Not	14 X7 Dan.Lor 1=Inc. More 0=Inc. Same	15 X8 Increm 1=Inc. Up 0=Inc. Not Up	16 X9 Sex 1=Male 0=Female	17 X10 Hype Ic. 1=Had Ic. 0=No Ic.	18 X11 Dan. Ic. 1=Had Ic. 0=No Ic.	19 X12 Rehab 1=1-Y Yrs. 0=0+ Yrs.
1	0–5	3																
2	P	4																
3	L	5	4.9	11.6	0.138	−16.0	−7.4 (.133)	−6.3 (.290)	8.1 (.178)	14.4 (.483)	−1.5 (.763)	8.9 (.077)	−0.1 (.985)	1.1 (.828)	1.0 (.839)	5.4 (.542)	−6.9 (.344)	7.0 (.283)
4	A Y	3–5	4.9	11.6	0.138	−16.0	−7.4 (.133)	−6.3 (.290)	8.1 (.178)	14.4 (.483)	−1.5 (.763)	8.9 (.077)	−0.1 (.985)	1.1 (.828)	1.0 (.839)	5.4 (.542)	−6.9 (.344)	7.0 (.283)
5	6–17	3		13.5														

Table 3. Days Missed From Major Activities. Average Values And Regression Results For Both Lake County and Montmorency County[d]

1 Regression Equation	2 Age and Activity	3[a] Limitation	4 Days Missed Lake (Ave. values)	5 Days Missed Montmorency (Ave values)	6[b] R^2	7 X0 Constant	8[c] X1 County 1=Lake 0=Mont.	9 X3 Assist. 1=Not Ass. 0=Pub.Ass.	10 X4 Resid. 1=5 yrs + 0=1-4 yrs	11 X5 San. 1=All San. 0=Not All San.	12 X6 Heat 1=Heat Up 0=Heat Not Up	13 X7 Nutrit. 1=Nutrit. Up 0=Nutrit. Not Up	14 X8 Doctor 1=Doc. More 0=Doc. Same	15 X9 Income 1=Inc. Up 0=Inc. Not Up	16[c] X10 Sex 1=Male 0=Female	17 X12 Phys. Ex. 1=Had Ex. 0=No Ex.	18 X13 Den. Ex. 1=Had Ex. 0=No Ex	19 X14 Educ. 1=0-8 Yrs. 0=9+ Yrs.
1	0-5	3																
2	P	4																
3	L	5	4.9	11.6	0.138	-16.0	-7.4 (.133)	-6.3 (.290)	8.1 (.178)	14.4 (.483)	-1.5 (.763)	8.9 (.077)	-0.1 (.985)	1.1 (.828)	1.0 (.835)	5.4 (.542)	-6.9 (.344)	7.0 (.283)
4	A Y	3-5	4.9	11.6	0.138	-16.0	-7.4 (.133)	-6.3 (.290)	8.1 (.178)	14.4 (.483)	-1.5 (.763)	8.9 (.077)	-0.1 (.985)	1.1 (.828)	1.0 (.835)	5.4 (.542)	-6.9 (.344)	7.0 (.283)
5	6-17	3		13.5														
6	P	4	10.0	15.3														
7	L	5	5.1	6.8	0.096	1.1	-2.2 (.133)	-2.3 (.111)	1.3 (.404)	1.2 (.715)	0.8 (.528)	2.2 (.098)	1.2 (.367)	-0.4 (.747)	1.3 (.306)	0.5 (.730)	2.0 (.174)	2.3 (.093)
8	A Y	3-5	5.2	7.3	0.111	0.5	-2.7 (.059)	-2.1 (.149)	2.1 (.192)	1.3 (.717)	0.6 (.621)	2.5 (.069)	1.1 (.396)	-0.6 (.660)	1.1 (.381)	1.3 (.384)	2.1 (.146)	2.4 (.075)
9	6-17	3	3.5	2.0														
10	S	4																
11	C H	5	4.2	6.6	0.140	0.2	-3.4 (.003)	-0.1 (.947)	1.3 (.285)	1.2 (.690)	0.5 (.654)	1.2 (.258)	0.4 (.676)	0.9 (.376)	1.0 (.296)	1.2 (.315)	1.5 (.183)	2.7 (.013)
12	O O L	3-5	4.1	6.5	0.138	0.8	-3.3 (.004)	-0.1 (.924)	1.3 (.280)	0.7 (.792)	0.4 (.680)	1.2 (.261)	0.3 (.756)	0.9 (.392)	1.2 (.226)	1.0 (.371)	1.6 (.162)	2.6 (.015)
13	18-65	3	50.4	84.5	0.269	95.8	-15.5 (.565)	12.6 (.575)	2.7 (.926)	-16.4 (.659)	-0.8 (.971)	7.3 (.757)	-41.8 (.060)	-26.1 (.400)	17.9 (.407)	23.2 (.625)	9.1 (.710)	-58.2 (.010)
14	H O	4	17.3	16.4	0.458	-21.0	11.3 (.312)	-16.4 (.203)	-2.3 (.857)	29.4 (.260)	0.9 (.928)	-0.3 (.977)	-9.4 (.405)	-12.6 (.269)	8.8 (.482)	20.2 (.091)	10.5 (.314)	7.8 (.489)
15	M W E O	5	5.9	6.6	0.194	15.4	-2.9 (.295)	4.1 (.168)	-8.7 (.010)	-11.3 (.018)	-1.4 (.586)	2.7 (.306)	0.6 (.819)	3.1 (.255)	-3.5 (.186)	5.9 (.068)	-1.9 (.517)	5.7 (.069)
16	R K	3-5	20.4	23.3	0.063	17.8	-5.3 (.450)	7.5 (.304)	1.2 (.889)	-9.8 (.428)	-4.0 (.561)	-4.0 (.554)	-3.4 (.609)	-8.6 (.231)	6.9 (.310)	23.0 (.009)	-1.6 (.829)	-6.7 (.360)
17	18-65	3	37.3	4.0	0.510	-139.4	68.0 (.146)	8.7 (.852)	-48.9 (.260)	68.3 (.273)	-34.6 (.366)	27.9 (.518)	24.5 (.458)	-38.9 (.298)	23.4 (.462)	111.9 (.115)	-74.2 (.094)	27.2 (.433)
18	W O	4		15.3														
19	R	5	3.8	9.1	0.245	-11.4	-7.4 (.084)	0.3 (.957)	-4.6 (.390)	6.6 (.498)	-0.4 (.924)	3.0 (.468)	1.0 (.828)	-0.3 (.949)	3.4 (.435)	12.7 (.039)	0.5 (.913)	13.1 (.013)
20	K	3-5	17.1	8.6	0.149	-5.1	8.9 (.282)	8.4 (.388)	-7.7 (.436)	7.7 (.668)	-9.3 (.249)	-4.9 (.537)	-2.9 (.730)	-6.0 (.475)	6.7 (.388)	15.2 (.167)	-9.4 (.267)	14.3 (.138)
21	66+	3	43.1	26.2	0.189	102.6	36.7 (.244)	16.0 (.619)	11.2 (.764)	-17.4 (.619)	-14.5 (.610)	-23.7 (.375)	9.6 (.719)	-6.9 (.816)	-15.3 (.517)	-61.6 (.201)	-16.3 (.562)	-4.2 (.878)
22	H	4	37.5	57.5														
23	O W M O	5		5.0	0.725	-60.3	-24.5 (.048)	3.9 (.598)	23.0 (.132)	19.7 (.076)	-6.4 (.390)	15.0 (.117)	4.8 (.306)	15.7 (.047)	4.8 (.369)	13.7 (.225)	-2.6 (.638)	17.5 (.087)
24	E R K	3-5	4.4	22.9	0.172	69.9	33.9 (.068)	10.6 (.624)	11.7 (.645)	-48.3 (.040)	-23.1 (.213)	-17.3 (.346)	-5.5 (.736)	-14.6 (.433)	-5.9 (.699)	-21.5 (.480)	-11.2 (.565)	4.4 (.801)

[a] Activity limitations should be interpreted as follows: 3=limited in kind of activity, 4=limited in amount of activity, 5= no limitations.

[b] R^2 refers to the total equation.

[c] Variables X2 and X11 are omitted from the equations since the variables (race and health center) occur only in observations of the Lake County population.

[d] Numbers in parentheses represent significance levels.

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Where i = 1 ...
i = 5 ...
i = 9 ...
i = 13 ...
i = 17 ...
i = 21 ...

multiplying the number of days missed by an index of (all workdays:work opportunity days).

For instance if it is assumed that there are 240 work days during a year (12 months x 4 weeks each x 5 days each = 240) the index for Lake county will be 240/137 = 1.75 and the index for Montmorency county will be 240/193 = 1.24. Multiplying these indices with the number of reported days will change the number of days missed in Lake county from 17.1 to (17.1 x 1.75) = 29.9 and the number of days missed in Montmorency county from 8.6 to (8.6 x 1.24) = 10.7.[10]

The preceding example was based on average work opportunity days. To make the measure more specific it is suggested to calculate in further studies the index for every individual (of the working group) directly and use individually adjusted values as the basis for computation. Such a procedure will facilitate a comparison of adjusted values for different sections of the sample.

e. Regression Analysis of Days Lost from Role Fulfillment

A linear regression routine was employed to establish the impact of various variables on the number of days lost from activities. Dependent variables were:

Y_1 = Days missed from activity,

where i = 1 ... 4: age 0-5, play activities
i = 5 ... 8: age 6-17, play activities
i = 9 ... 12: age 6-17, school activities
i = 13 ... 16: age 18-65 homework activities
i = 17 ... 20: age 18-65, work activities
i = 21 ... 24: age 66, homework activities.

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All independent variables were specified as dummy variables.

XI = County of residence. (This was the major health input variable. Dummy "I" specified the group that lived in Lake county (i.e. received the "treatment"). Dummy "0" specified the "comparison group,"i.e. those living in Montmorency county.
X2 = Race: 1 = white, 0 = black
X3 = Assistance status: 1 = not on assistance, 0 = on assistance.
X4 = Length of residency: 1 = lived longer than four years in area, 0 = lived between one and four years in area.
X5 = Sanitary facilities: 1 = had all sanitary facilities, 0 = did not have all sanitary facilities.
X6 = Heating: 1 = heating improved, 0 = heating did not improve.
X7 = Nutrition: 1 = nutrition improved, 0 = nutrition did not improve.
X8 = Need for doctor services: 1 = would need more doctor services, 0 = do not need more.
X9 = Income: 1 = income went up, 0 = income did not go up.
X10= Sex: 1 = Male, 0 = Female.
X11= Enrollment in Health Center in Baldwin: 1 = enrolled, 0 = not enrolled.
X12= Physical examination: 1 = had exam during the last five years, 0 = did not have exam.
X13= Dental Examination: 1 = had exam during the last year, 0 = did not have exam.
X14= Education: 1 = head of household had 0-8 years of education, 0 = head had 9 or more years of education

Estimation for Both Lake County and Montmorency

The first run of the 24 equations involved the total sample population. Since X2 (race) and X11 (enrollment in Health Center in Baldwin) were only applicable to the Lake county population, they were omitted from the regression equation. Table 3 presents the coefficients of the estimation. Significance levels are listed in parentheses. Coefficients with a significance level less than 0.10 are in squares.

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The results suggest that being in Lake county (i.e. having access to the treatment) has the greatest impact on reducing the number of days missed. The other statistically significant coefficients are not so complete and unambiguous as the county coefficients. The presence of sanitary facilities reduces "days missed" in two equations but increases them in the third. The fact that sicker people go more often to the doctor is represented by more "days missed" by that part of the population which had a physical examination during the past five years.

Estimation of Lake County Population Only

Since race (X2) and enrollment (X11) are variables which are relevant to Lake county exclusively it was decided to run a separate set of regressions for the Lake county population only. Table 4 presents the results of the analysis. Length of residency, nutrition, income, sex, physical exam and level of education had some influence on the number of days missed. However, there were too few significant variables to allow a particular interpretation.

Discussion of Regression Results

The regression results indicated that being in Lake county ("treatment") has the strongest effect on reducing days lost from role fulfillment. The impact of other variables was not uniform and/or significant enough to warrant an interpretation.

Yet, several variables seemed to be more important than others. The distribution of squares both in Table 3 and Table 4 suggests to concentrate in future studies on

1 Regression Equation	2 Age and Activity	3* Limitation	4,5 Dam Mileml (Ave. Values)	6,7 R^2	8 σ_ε Constant	9 X1 Incr. 1=Male 0=Female	10 X2 Aanint. 1=Hist. Ann. 2=Pub.Ann.	11 X4 Resid. 1=5 yrs + 0=1-4 yrs	12 X5 Dan. 1=All Sun. 0=Not all Sun.	13 X6 Heat 1=Heat Up 0=Heat Not Up	14 X7 Nutrit. 1=Nutr. Up 0=Nutr. Not Up	15 X8 Doctor 1=Doc. Home 0=Doc. Same	16 X9 Income 1=Inc. Up 0=Inc. Not Up	17 X10 Sex 1=Male 0=Female	18 X11 Fl. Shelter 1=Yes 0=No Fl. Sh.	19 X12 Hwys. Ea. 1=Hwy Ea. 0=No Ea.	20 X13 Lwrs. Ea. 1=Lwrs Ea. 0=No Ea.	21 X14 Educ. 1=5-8 Yrs. 0=9+ Yrs.
1	0-5	3																
2	P	4																
3	L	5	4.9	0.187	-17.1	2.5 (.603)	-2.8 (.615)	-1.8 (.808)	3.2 (.827)	-2.0 (.702)	5.4 (.335)	2.3 (.626)	2.3 (.619)	-3.7 (.420)	8.3 (.201)	18.7 (.252)	-4.6 (.365)	-6.9 (.267)
4	A Y	3-5	4.9	0.187	-17.1	2.5 (.603)	-2.8 (.615)	-1.8 (.808)	3.2 (.827)	-2.0 (.702)	5.4 (.335)	2.3 (.626)	2.3 (.619)	-3.7 (.420)	8.3 (.201)	18.7 (.252)	-4.6 (.365)	-6.9 (.267)
5	6-17	3																

Table 4. Days Missed From Major Activities. Average Values and Regression Results for Lake County Only[d]

1 Regression Equation	2 Age and Activity	3[a] Limitation	4,5 Days Missed Lake (Ave. Values)	6[b] R^2	7[c] X0 Constant	8 X2 Race 1=White 0=Black	9 X3 Assist. 1=Not Ass. 2=Pub.Ass.	10 X4 Resid. 1=5 yrs + 0=1-4 yrs	11 X5 San. 1=All San. 0=Not all San.	12 X6 Heat 1=Heat Up 0=Heat Not Up	13 X7 Nutrit. 1=Nutr. Up 0=Nutr. Not Up	14 X8 Doctor 1=Doc. More 0=Doc. Same	15 X9 Income 1=Inc. Up 0=Inc. Not Up	16 X10 Sex 1=Male 0=Female	17 X11 H. Center 1=Enroll. 0=Not Enr.	18 X12 Phys. Ex. 1=Had Ex. 0=No Ex.	19 X13 Den. Ex. 1=Had Ex. 0=No Ex.	20 X14 Educ. 1=0-8 Yrs. 0=9+ Yrs.
1	0-5	3																
2	P	4																
3	L	5	4.9	0.187	-17.1	2.5 (.603)	-2.8 (.615)	-1.8 (.808)	3.2 (.827)	-2.0 (.702)	5.4 (.335)	2.3 (.626)	2.3 (.619)	-3.7 (.420)	8.3 (.201)	14.7 (.252)	-4.6 (.365)	-6.9 (.267)
4	A Y	3-5	4.9	0.187	-17.1	2.5 (.603)	-2.8 (.615)	-1.8 (.808)	3.2 (.827)	-2.0 (.702)	5.4 (.335)	2.3 (.626)	2.3 (.619)	-3.7 (.420)	8.3 (.201)	14.7 (.252)	-4.6 (.365)	-6.9 (.267)
5	6-17	3																
6	P	4	10.0															
7	L	5	5.1	0.097	-1.5	-0.9 (.785)	-2.5 (.379)	3.8 (.172)	1.1 (.817)	-1.4 (.609)	3.9 (.183)	0.5 (.848)	-3.1 (.161)	-0.5 (.773)	2.7 (.290)	2.1 (.535)	1.2 (.631)	0.7 (.812)
8	A Y	3-5	5.2	0.112	-2.5	-2.0 (.517)	-1.7 (.542)	4.4 (.110)	1.6 (.749)	-2.7 (.303)	4.4 (.132)	0.2 (.949)	-3.5 (.106)	-0.7 (.720)	3.1 (.206)	3.2 (.301)	1.1 (.640)	0.9 (.755)
9	6-17	3	3.5															
10	S	4																
11	C	5	4.2	0.213	0.3	-0.4 (.772)	1.5 (.256)	3.5 (.010)	-1.8 (.495)	-1.7 (.188)	-0.1 (.933)	-1.8 (.133)	-0.4 (.676)	0.2 (.831)	1.1 (.368)	1.3 (.421)	2.1 (.079)	2.4 (.095)
12	O O L	3-5	4.1	0.215	0.1	-0.4 (.773)	1.5 (.245)	3.5 (.008)	-1.6 (.487)	-1.7 (.164)	-0.1 (.931)	-1.9 (.123)	-0.4 (.664)	0.2 (.787)	1.1 (.352)	1.3 (.389)	2.1 (.078)	2.3 (.095)
13	18-65	3	50.4	0.452	157.2	15.5 (.579)	-2.9 (.910)	-46.6 (.156)	-27.6 (.460)	26.7 (.240)	-5.2 (.788)	-26.5 (.250)	-16.9 (.494)	-27.0 (.239)	-4.3 (.886)	8.1 (.816)	-6.1 (.790)	-45.9 (.037)
14	H O M E W O R K	4	19.3															
15		5	5.9	0.281	7.1	2.7 (.435)	-3.6 (.302)	-5.3 (.181)	2.7 (.627)	-3.0 (.411)	5.1 (.110)	-1.2 (.704)	1.8 (.545)	-3.3 (.282)	-2.3 (.553)	1.5 (.805)	-1.7 (.609)	2.3 (.570)
16		3-5	20.4	0.048	33.2	2.8 (.784)	2.4 (.793)	-8.3 (.437)	-5.8 (.672)	0.8 (.925)	-9.0 (.258)	-2.3 (.790)	-1.5 (.850)	-7.3 (.387)	5.8 (.577)	8.5 (.545)	-6.9 (.420)	-7.0 (.431)
17	18-65	3	37.3	0.870	28.8	-394.8 (.395)	32.3 (.918)	87.0 (.700)	246.3 (.345)	-355.5 (.408)	173.5 (.453)	-127.8 (.617)	-110.5 (.530)	-17.5 (.922)	-286.3 (.506)	183.8 (.432)	-46.8 (.801)	238.3 (.393)
18	W O R K	4																
19		5	3.8	0.635	-25.6	-7.1 (.176)	-5.2 (.265)	7.6 (.125)	8.6 (.200)	1.7 (.759)	8.4 (.040)	-1.4 (.749)	-7.5 (.030)	8.0 (.040)	-2.3 (.593)	15.8 (.098)	1.0 (.759)	10.2 (.105)
20		3-5	17.1	0.325	-27.9	-2.0 (.939)	17.8 (.416)	8.5 (.705)	32.2 (.332)	-12.4 (.578)	-17.2 (.415)	-31.0 (.170)	-16.0 (.378)	16.9 (.357)	-32.1 (.143)	45.2 (.210)	-11.0 (.535)	38.7 (.090)
21	65+	3	43.1	0.322	206.3	-15.7 (.735)	-1.4 (.979)	-36.2 (.512)	35.5 (.569)	19.2 (.669)	-62.4 (.171)	6.4 (.864)	22.1 (.591)	5.9 (.865)	12.5 (.830)	-155.4 (.220)	-9.0 (.805)	-6.3 (.881)
22	H O M E W O R K	4	37.5															
23		5																
24		3-5	4.4	0.257	208.5	-6.7 (.810)	-3.9 (.928)	-14.8 (.676)	12.3 (.806)	6.9 (.808)	-42.7 (.143)	-6.2 (.798)	6.8 (.782)	-0.5 (.983)	6.9 (.873)	-141.1 (.154)	-7.4 (.771)	-19.0 (.501)

[a] Activity limitations should be interpreted as follows: 3=limited in kind of activity, 4=limited in amount of activity, 5=no limitations.

[b] R^2 refers to total equations which are being estimated.

[c] Variable X1 is omitted from the equations since this table refers to Lake County only.

[d] Numbers in parentheses represent significance levels.

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variables X1 (treatment), X4 (length of residency), X5 (sanitary facilities), X7 (nutrition), X12 (physical exam), X13 (education) and to omit the others from the questionnaire and from the analysis.

f) Perceived Availability and Quality of Local Health Care

This section summarizes efforts to measure the availability and quality of health services as perceived by the Lake county sample and by the Montmorency county sample. The respondents were asked to "rate the availability and quality of health care in the area" on a six level scale indicating "poor" to "good." To aid the respondents in identifying a position it was decided to label the poorest position (-3) and the best position (+3). To prevent respondents from immediately settling for the "in between," no average position was marked. Individuals who insisted on a middle position were asked to reconsider their answers and choose either (-1) or (+1). It was felt that this procedure would not introduce any bias since truly indifferent individuals would make their choice at random and those who were not truly indifferent would choose the side which comes closer to their previously "hidden" position.

The rating was done both for 1968 and 1971/72. The scores were later transformed into an ascending order between 1 = poor and 6 = good. To get a measure for the change between 1968 and 1971/72 an arbitrary "rule" was developed which would assign the highest value to a change from very low to very high and the lowest score to a change from very high to very low. Positions between the

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highest and the lowest "change index" were assigned according to a "priority scheme" which generally assumes that a change to a higher position is preferred to a change to a lower position. Further priorities are assigned in the following way:

Priority I: Moving from below average to a position above average.

Priority II: Above average and moving up.

Priority III: Above average and staying at same level.

Priority IV: Below average but moving up.

Priority V: Above average but falling.

Priority VI: Below average and staying at same level.

Priority VII: Below average and falling.

Priority VIII: Moving from above average to a position below average.

This "rule" was established arbitrarily and reflects the author's intuitive evaluation of the importance of various changes. A different weighting would, of course, result in a different priority scheme. In spite of its arbitrary character, it was believed that this measure of change is superior to a procedure which would just record upward or downward change regardless of the starting and final position. The graphical representation of the applied "priority scheme" is shown in Figure 6.

Once the scores for 1968, 1971/72 and the "change index" for 1968-1971/72 were obtained it was possible to compare the two counties. Table 5 shows that the Lake county sample ranked availability and quality of


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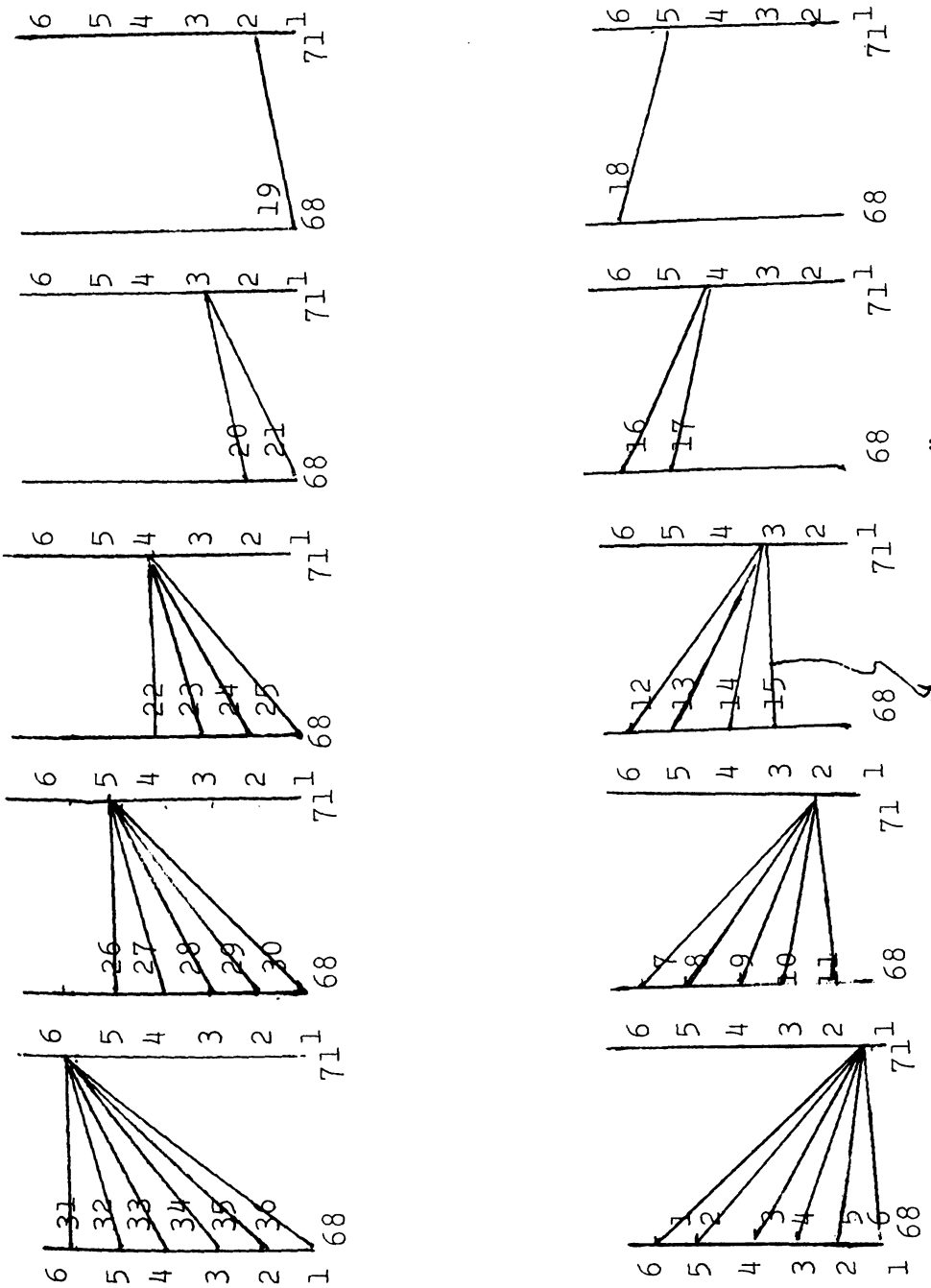

Figure 6. Graphical representation of "priority scheme" which underlies the establishment of "change index."

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Table 5. Indices of Perceived Availability and Quality of Local Health Care.

Index	Lake Sample	Montmorency Sample	Significance Level of Difference
1968	3.39	2.63	0.01
1971/72	4.50	3.31	0.01
1968-71/72	25.21	18.61	0.01

Table 5 shows that Lake county also had a higher "change index", thus, indicating greater improvement between 1968-1971/72 than Montmorency. The advantage of the "change index" results from the fact that it gives a relative measure of change for each individual. The disadvantage is its dependence on an arbitrary "priority scheme" as outlined in the preceding paragraphs. Further research is required to determine the sensitivity of the "change index" to various "priority schemes."

This section presented a measure which utilizes the perception of clients as an indicator for evaluation. It is obvious that this indicator measures more the input than the output of health services. To evaluate the perception of health services outputs it is necessary to examine perceived health.

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g) Perceived Health

The analysis of perceived health followed the same pattern as the one described in the preceding section. The indicators were obtained from questions 1 and 2 of the Member Questionnaire (see Appendix C). The merit of this procedure is that it establishes time related output indicators which can be compared between the treatment group and the comparison group.

Table 6. Indices of Perceived Health

Index	Lake Co. Sample	Montmorency Sample	Significance of Difference
1968	4.28	4.04	0.06
1971/72	4.18	3.94	0.06
1968-71/72	21.53	20.27	0.06

Utilizing the procedure of the previous section it was possible to establish Table 6. The table indicates that the Lake county sample rated its health significantly higher than the Montmorency county sample although the differences were less pronounced than the differences observed for health services. This can be interpreted as indicating that health services have improved considerably in Lake county, yet have not yet produced too noticable improvements in health status.

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8. Summary

This chapter presented an evaluation of the Lake county Health Project by employing an analysis referred to as "ad hoc comparison." Emphasis was placed on the derivation of role fulfillment indicators measured by days missed from major activities. A discussion of the use of perceived indicators of health concluded the chapter.

Based on the assumption that the Montmorency county sample constituted a valid comparison group it could be established that the Lake County Health Project had a positive impact on reducing the number of days missed from role fulfillment. A detailed discussion of the methodological and conceptual problems which surfaced through this analysis is given in Chapter VII.

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FOOTNOTES

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10. However, the adjusted values of "days missed from work" are only relevant for a comparison among work days missed. Comparing them with play days or home work days would be inappropriate because these values are not subjected to the same transformation.

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CHAPTER VI

IMPACT OF HEALTH CENTER: METHOD II, SCHOOL ATTENDANCE ONLY

One of the principal roles our society expects individuals between ages 6 and 17 to fulfill is the ability to prepare themselves for the future life by means of formal and informal learning. A loss or reduction of this ability to learn and study has severe consequences in future years. Missed school days are, therefore, foregone investment opportunities. If school days are missed because of health reasons they are also relevant indicators of discomfort or, in economic terms, indicators of disutility. How much of this loss is a loss in investment and how much is a loss in consumption shall not be discussed herein. The emphasis is placed on the fact that good health has utility and is desirable. Once the relevance of school attendance as an output indicator has been established, the analyst faces the problem of devising a procedure to measure and analyze the phenomenon "school attendance." This chapter attempts to analyze attendance data which have been collected by the Baldwin area school district (Lake County, Michigan). The current literature gives only a few references as to the applicability of school attendance records in health program evaluation. Deshaies and Seidman[1] recommend this approach

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and Tuthill et. al.[2] propose to utilize attendance rates in evaluating school health programs.

1. Conceptual Considerations

The use of attendance records as program evaluation tools necessitates the transformation of the raw data into units which are comparable over time and across classes, schools and school districts. The most desirable way of measuring variations in school attendance is the ratio (a) of attended days (b) over attendable days (c), that is a = b/c. Attendance can vary between full (a = 1) and zero (a = 0). Such a ratio standardizes the measure of school attendance for fluctuations in attendable school days due to changing weather conditions and/or political events (e.g. teacher strikes). The ratio (a), if defined for an individual student, is called (aI) and can be aggregated and averaged for classes (aaC), parts of classes (aaP) and schools (aaS) to facilitate comparisons among various groups of students.

To accomplish a "with and without" analysis it is necessary to isolate non-project effects using design procedures as discussed in the preceding chapter. An ideal design would require the identification of a control group which did not have access to the Health Center but shared all other relevant socioeconomic criteria of the treatment population.

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2. Practical Problems--Data

An examination of the available attendance records of the Baldwin area school system (Elementary, Junior High, Senior High) revealed the following:

(i) Records for the years 1966-1972 are available for only 70 percent of all classes.

(ii) There is a lack of uniformity in reporting, despite the use of standardized reporting forms.

(iii) Records are inconsistent in showing the number of attendable days.

(iv) Accuracy and completeness of reporting varies considerably among teachers.

(v) Completeness of reporting drops generally toward the end of the school year.

(vi) Many records are not yet summarized, thus necessitating extensive efforts of compilation before any computation can be undertaken.

Despite these dificiencies, it was generally observed that if attendance is recorded for a specific day the record is complete for all members of the class.

3. Practical Problems--Design

It was impossible to identify a control group within the school district. Without a classification of physiological states it was impossible to identify individuals who differed only in the amount and/or quality of care received. It had to be assumed that those desiring the

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Project's services would get services to "satisfy their needs" and that others would get them from other providers. The only comparison which could be made was between those enrolled in the Health Center and those not enrolled in the Health Center. However, this required disregarding non-project influences such as differences in income, race, previous health history, and access to other types of care. Nevertheless, it was hypothesized that "some control" could be maintained by comparing the ratio of absences between enrolled and not enrolled. It was believed that a decrease of this ratio over the life of the Health Center would be attributable to the health services which were provided through the Center. This belief seemed justified in light of the assumption that both enrolled and not enrolled students were subjected to similar changes in non-project influences and that these changes did not change the relative importance of non-project influences. This assumption is the pillar upon which the validity of this procedure rests. It implies, for instance, that if the not enrolled group had twice the amount of income as the enrolled group before the Health Center was established it would have twice the amount after the Center was established. It also implies that a ten percent increase in disposable income did not contribute more (or less) to the health status of the children of enrolled families than to the children of not enrolled families.

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4. Procedure

To compensate for the discussed limitations of data and design the following procedures were employed for assessing the Health Center's impact on school attendance. The general approach was to base the investigation on the index of (absences of the enrolled group of the class) divided by (absences of the not enrolled group of the class). It was established that the non-reporting of absences was a random phenomenon and did not introduce bias in a comparison between classes. (This could have had serious effects on the health outcomes if the before-project teacher reported absences only in winter and the after-project teacher reported them only during the months with the mild weather.)

If A_i is the number of absent days of individual (i), the average absence (AA) is defined by $AA = \frac{1}{n}$ SUMAi where (i = 1 . . .n). The average absence ratio (AAR) is obtained by dividing the average absence of the group enrolled in the Health Center (AAE) by the average absence of the not-enrolled group (AAN), leading to AAR = (AAE): (AAN). Figure 7 gives an example of such a calculation. It was assumed that this procedure provides sufficient information for testing the difference in school attendance "without" and "with" the Health Center. However, the data do not lend themselves for calculating total days missed.

Since it was impossible to get year by year registration records of the Health Center, a directory dated "Fall 1971" was used to divide school classes into HC-enrollees

Students	1	2	3	4	5	. . . .	Summary of days absent
Enrolled 1	A			A	A		3
Enrolled 2		A					1
Enrolled 3		A					1

	Halfdays (A = absence)						
Students	1	2	3	4	5	. . . .	Summary of days absent
Enrolled 1	A			A	A		3
Enrolled 2		A					1
Enrolled 3		A					1
Enrolled 4				A			1
n = 4							SUMAE = 6 $AAE = \frac{1}{n} 6$ $SUMAE = 4$
Not Enrolled 1	A						1
Not Enrolled 2		A			A		2
Not Enrolled 3							
Not Enrolled 4				A			1
Not Enrolled 5				A			1
m = 5							SUMAN = 5 $AAN = \frac{1}{m} 5$ $SUMAN = 5$
							AAR=(AAE): (AAN)=$\frac{6}{4}$):($\frac{5}{5}$)

Figure 7. Calculation of Average Absence Ratios

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and non-enrollees. Since the 1971 directory was also used in differentiating classes of previous years it is possible that students who were enrolled with the Center in 1968, for instance, but left the Center or the area in subsequent years were classified as non-enrollees just because they were not listed in the 1971 directory. This error could be of significant consequence in determining average attendance ratios (AAR) during the base period (before the Health Center was established).

Selection of Classes

Because of the considerable amount of time involved in counting for every individual student the days he/she was absent only 12 classes were selected for this investigation. The selection of classes was based on completeness of entry in the record books and on the comparability of classes.

Records of students who were born in 1955 were examined when the students were in the 6th and 7th grade during 1966/67 and 1967/68--the "BEFORE Center" years and again when they were in the 10th and 11th grade during 1970/71 and 1971/72--the "AFTER Center" years. (See Table 7) The same procedure was used for students who were born in 1954 when they were students in grades 7 and 8 (1966-68, BEFORE) and in grades 11 and 12 (1970-72, AFTER). Furthermore, the attendance of students born in 1958-59 was computed for the years of 1970-72 (AFTER) when they were in grades 6 and 7 and 7 and 8, respectively. Table 7 gives a summary of the collected information.

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A) Groups of students who are enrolled in Health Center	1 1 1 1
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Table 7. Average Number of Halfdays Missed by Students Before and After the Health Center Was Established. (a,b)

Groups of Students	Year of Birth of Students	$\frac{1}{n}$ (SUM B $\bar{i}$)		$\frac{1}{n}$ (SUM A $\bar{i}$)	
		Before Center		After Center	
		1966/67	1967/68	1970/71	1971/72
		Average number of halfdays missed[d]			
A) Groups of students who are enrolled in Health Center	1959			c) (6)42;24;33	(7) 35
	1958				c)(8)37;30
	1955	c) (6)27;30;33	(7) 42	(10) 46	(11) 71
	1954	(7) 77	(8) 21	(11) 44	(12) 68
B) Groups of students who are enrolled in Health Center	1959			c) (6)29;38/27	(7) 25
	1958			(7) 26	c)(8)34;20
	1955	c) (6)20;21;15	(7) 27	(10) 34	(11) 53
	1954	(7) 70	(8) 22	(11) 32	(12) 47

Note: a) Figures rounded to nearest halfday.
b) Since the completeness of attendance records varied considerably from class to class only comparisons within the same class of the same school year are relevant. (See the following table for such a comparison.) Numbers in parentheses refer to grade levels.
c) Some grades were split up in several sections which resulted in varying completeness of reporting. Averages for each section are documented separately.
d) Average number of halfdays missed (AA) calculated by $AA = \frac{1}{n} SUMAi$ as demonstrated in Figure 5 of this chapter.

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5. Analysis

Despite the limited amount of collected data, it is advisable to attempt an analysis if for no other reason than to show how such an analysis can be organized. The suggested approach is to examine the relationship of enrolled and NOT enrolled groups (cross sectional comparison within grade levels) over time (time series analysis) and between classes at the same point in time (cross sectional analysis).

a) A Cross Sectional Comparison within Grade Levels

Since the completeness of attendance records varied considerably from class to class, only comparisons within the same class of the same school year were relevant. Grade 8 (1967/68) and grade 8 (1970/71, Section II) were the sole instances where the group enrolled in the Health Center missed fewer days than the group which was not enrolled (See Table 7). The ratios between the two sets of data indicate how much the two groups differ in terms of absence from school. This information is displayed in Table 8. Thus, the population born in 1955 indicates the ratio 1.61 for 1966/67, 1.57 for 1967/68, 1.34 for 1970/71 and 1.35 for 1971/72.

b) Time Series Analysis with Reference to Grade Levels

In observing classes over time it is important to realize that the composition of classes changes. The following analysis is divided into two parts. One part assumes that being in a certain class is a sufficient criterion for comparison. The section is, therefore, called "Same Classes--

Table 8. Average Absence Ratios, Trend Index and Comparative Index of Absence Ratios.[a,b]

Year of Birth of Students	Average Absence Ratios (AAR) (Half days missed by enrolled group): (Half days missed by NOT enrolled group)	Trend Index of Absence Ratios	Comparative Index of Absence Ratios
	Individual Grade Levels[b]		

Table 8. Average Absence Ratios, Trend Index and Comparative Index of Absence Ratios.[a,b]

Year of Birth of Students	Average Absence Ratios (AAR) (Half days missed by enrolled group): (Half days missed by NOT enrolled group)				Trend Index of Absence Ratios	Comparative Index of Absence Ratios
Section A) Ratios of Individual Grade Levels[b]						
	BEFORE		AFTER		Ratio of (AFTER):(BEFORE)	Ratio of (AFTER):BEFORE)
	1966/67	1967/68	1970/71	1971/72		
1959			(6) 1.11	(7) 1.36		
1958			(7) 1.24	(8) 1.29		
1955	(6) 1.61	(7) 1.57	(10) 1.34	(11) 1.35		
1954	(7) 1.10	(8) 0.93	(11) 1.37	(12) 1.42		
Section B) Average of Ratios of Two Consecutive School Years (obtained from Section A)						
	1966 - 1968		1970 - 1972			
1959			(6-7)	1.24		0.77
1958			(7-8)	1.27		1.25
1955	(6-7)	1.59	(10-11)	1.35	0.84	
1954	(7-8)	1.01	(11-12)	1.39	1.37	
Section C) Average of "BEFORE" and "AFTER" Ratios (obtained from Section B)						
1959 and 1958				1.25		0.96
1955 and 1954		1.30		1.37	1.05	

Note: a) Numbers in parentheses refer to grade levels.
b) The figures for this table were obtained from the original data and not from the rounded-up numbers of Table 1.

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Individuals with Similar Characteristics." The other part assumes that only the same individuals should be observed over time ("Same Classes--Same Individuals").

Same Classes--Individuals with Similar Characteristics

This procedure examines a paired sample of classes over time. One class made up of students born in 1954 and one consisting of students born in 1955 is traced through grades 6, 7, 8, 10, 11 and 12 respectively. Students are divided into enrollees and non-enrollees. While they are not the same students, they share characteristics such as age and being in the same class.

Table 8, Section A shows that in 1966/67 in the class of students born in 1955 the enrolled group missed 1.61 times as many days as the NOT enrolled group. During the following years the enrolled group continued to miss more days than the NOT enrolled group, yet in 1971/72 they missed only 1.35 times as many days as the NOT enrolled group. A reverse trend appears to hold for the students born in 1954 who started out with a ratio of 1.10 in 1966/67 and ended up with a ratio of 1.42 in 1971/72.

Section B of Table 8 averages the absence ratio over both the BEFORE and the AFTER two-year periods. The absence ratio between enrolled and not enrolled of those born in 1955 decreases from 1.59 to 1.35. The group born in 1954, however, shows an increase from 1.01 in 1966-68 to 1.39 in 1970-72. The average of overall grades indicates an increase in the absence ratio from 1.30 in 1966-68 (BEFORE) to 1.37

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in 1970-72 (AFTER) for students born in 1954-55 (See Section C of Table 8).

The conflicting results do not permit accepting the hypothesis that school attendance of the enrolled group has improved. In order to test whether this conflict is caused by students who were not living in the area throughout the complete period under investigation, a time series of those students residing in the School District both BEFORE and AFTER the Health Center's establishment is examined next.

Same Classes--Same Individuals

The requirement of residing in the School District at the two points in time plus being enrolled in the grades for which attendance records were available eliminated 60 percent of the students. The attendance of the remainder was again divided into four cells: enrolled, NOT-enrolled, AFTER AND BEFORE.

Two possibilities are open in the case where only those students are examined who have been residing in the School District both in 1966-68 and in 1970-72. One is to look at the trend of average absence ratios, the other is to compare the averages of individual trends. To make this difference clearer, consider EA1, EA2, ... EAn to be individual absences of enrolled students AFTER the Health Center was established and NA1, NA2,... NAn to be absences of NOT enrolled students AFTER the Health Center was established. Similarly let EB1, EB2,... EBn be individual absences of enrolled students BEFORE the Health Center was established

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and NB1, NB2,....NBn be individual absences of NOT enrolled students BEFORE the Center was established. The average absences for each of the four cases are: AAEA = $\frac{1}{n}$ (SUMEAi), AANA = $\frac{1}{n}$ (SUMNAi), AAEB = $\frac{1}{n}$ (SUMEBi), AANB = $\frac{1}{n}$ (SUMNBi). The average absence ratios of enrolled over NOT enrolled are AARA = (AAEA): (AANA) in the AFTER-period and AARB = (AAEB):(AANB) in the BEFORE period. The trend of average absence ratios is calculated as the ratio of AFTER over BEFORE or TA = (AARA):(AARB). Individual absence ratios (IAR) are established for the four cells, AFTER, BEFORE, enrolled, NOT-enrolled by dividing each absence by the total average absence of its period (TAAA for AFTER and TAAB for BEFORE), resulting in

IARAEi = (EAi):TAAA
IARANi = (NAi):TAAA
IARBEi = (EBi):TAAB
IARBNi = (NBi):TAAB

Individual trends (IT) are calculated by dividing for each individual the AFTER absence ratio by the BEFORE absence ratio. Thus ITEi = (IARAEi):(IARBEi) for students who are enrolled in the Center and ITNi = (IARANi):(IARBNi) for NOT enrolled students. The averages of the individual trends (AIT) are AITE = $\frac{1}{n}$ (SUM ITEi) for enrolled and AITN = $\frac{1}{n}$ (SUM ITNi) for NOT enrolled students.

Trend of Average Absence Ratios (TA)--An Analysis of Group Progress

Table 9 shows that even by limiting the analysis to those who resided in the school district during both periods

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Year of birth of students	Average Ratio o (Halfda
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1955	(6) 1.7
1954	(7) 1.1
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1955	(6-7)
1954	(7-8)
C. AVERAGE OF "AF	
55-/55	(6-7-8)

Note: a) Numbers

Table 9. Average Absence Ratios and Trend Index of Absence Ratios of Students Who Resided in the School District Both in 1966-68 and in 1970-72 a)

Year of birth of students	Average absence ratios (AAR) Ratio of (halfdays missed by the enrolled group): (Halfdays missed by NOT-enrolled group)				Trend index of Absence Ratios (AFTER):(BEFORE)
	BEFORE		AFTER		
	1966/67	1967/68	1970/71	1971/72	
A) RATIOS OF INDIVIDUAL GRADE LEVELS					
1955	(6) 1.71	(7) 1.73	(10) 1.60	(11) 1.27	
1954	(7) 1.12	(8) 1.10	(11) 1.42	(12) 1.43	
B) AVERAGE OF RATIOS OF TWO CONSECUTIVE SCHOOL YEARS (obtained from Section A					
1955	(6-7)	1.72	(10-11)	1.43	0.83
1954	(7-8)	1.11	(11-12)	1.43	1.28
C) AVERAGE OF "AFTER" AND "BEFORE" RATIOS (obtained from Section B)					
1954/55	(6-7-8)	1.41	(10-11-12	1.43	1.01

Note: a) Numbers in parentheses to grade levels.

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similar results are obtained as in Section B of this chapter. Those born in 1955 show a trend index of 0.83, those born in 1954 have one of 1.28 and the combined index is 1.01. The comparable figures in Table 8 are 0.84, 1.37 and 1.05, respectively.

Average of Individual Trends (AIT)--An Analysis of Individual Progress

With this procedure it is possible to observe individual progress of students over the course of the project. As summarized in Table 10, individual students increased their absences in each group. The increase was, however, higher for the enrolled group than for the NOT-enrolled group. Again, enrolled students born in 1955 showed a lower increase (1.14) than those born in 1954 (1.37).

c) Cross Section Analysis with Reference to Grade Levels

The problem with the previous comparison is that one does not compare the students at the same year in their own lives. One could hypothesize that those enrolled in the Health Center tend to increase their absences with growing age because of other, thus far unexplainable reasons. To isolate these effects, one has to examine students at comparable points in their lives, i.e. compare 6-7-8 graders BEFORE the Health Center was established with 6-7-8 graders AFTER the Health Center was established.

The available records limit the investigation to a comparison between 6-7-8 graders in 1966-68 and in 1970-72. From Table 8, Section A, one learns that those born in

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Table 10. Average of Individual Trend Indices of Paired Sample of Students Who Resided in the School District Both in 1966-68 and in 1970-72.[a]

Year of Birth of Students	Enrollment Status (Health Center)	Average of Individual Trend Between 1966-68 and 1970-72	(Enrolled):NOT-Enrolled)
1955	Enrolled	2.41	1.14
	NOT Enrolled	2.10	
1954	Enrolled	2.07	1.37
	NOT Enrolled	1.50	

Note: a) The individual trend indices were calculated by dividing individual AFTER-absence ratios by individual BEFORE-absence ratios. Individual absence ratios were established by dividing the half days missed by each student by the average number of half days missed by the student's total class.

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1955 (BEFORE) have a higher absence ratio than those born in 1959 (AFTER) while those born in 1954 (BEFORE) have a lower absence ratio than those born in 1958 (AFTER). The same appears in Section B of Table 8 where the results are partially averaged, resulting in a comparative index of 1.25 for those in grades (6-7) and of 0.83 for those in grades (7-8). Only by completely summarizing (Section C of Table 8) one arrives at a reduction in the absence rate from 1.30 in the BEFORE Health Center period to 1.25 in the AFTER Health Center period (Comparative Index: 0.96).

It is worthwhile to note that grades (7-8) in 1966-68 have consistently a lower absence ratio than the grades with which they are compared. This observation holds both for comparing similar grades at different points in time and for comparing similar classes at different points in time. Whether this is a peculiarity due to the data collection procedure or due to actual differences in half days missed cannot be determined from the small sample of 12 classes.

6. Conclusions

The analysis could not establish clear evidence of the impact of the project on the school attendance of the students enrolled in the Health Center. Comparing grades at the same level (comparative index of absence ratios: 0.96 in Table 8, Section C, would suggest a positive influence of the Health Center. Observing the same classes over time (trend index of absence ratios: 1.05) suggests a negative influence of the Health Center. If this evidence is split up into its components (Section B of Table 8) one sees that in both instances,

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different classes produce indices above or below 1.000. To test whether the differences are statistically significant in either situation one would have to include more classes in the analysis. An organized attendance record-keeping system is the basic requirement to make such an expanded study feasible.

a) Recorded vs. Reported Absence

Let us assume that more data were available and a difference in school attendance could be shown between the BEFORE and the AFTER period. Would the analysis be sufficient evidence to attribute this difference to the establishment of the Health Center? To shed some light on this question the attendance records of seven students were compared against survey data reported for the same seven students. The survey data were obtained as part of the survey discussed in Chapter V. Parents were asked to report the number of days their children could not go to school during the previous school year because of disability or health. Attendance records were obtained from the school records as discussed previously in this chapter.

Table 11 shows a comparison among the two sets of data. The average number of recorded absences is 61 whereas parents report only an average of six absences per year. The difference could be even bigger considering the fact that school attendance records are usually incomplete. The downward bias of recorded absence due to incomplete school records might, however, be comparable to under-reporting of absence by student's parents, thus resulting in the same

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Table 11. A Comparison Between Recorded and Reported Number of Half Days Missed. A Sample of Seven Students.

Individual Student	Sex	School Records: Recorded Number of Half Days Missed	Survey Data: Reported Number of Half Days Missed
		1971/72	
A	F	106	4
B	F	52	16
C	M	94	8
D	F	14	2
E	F	83	8
F	M	15	0
G	M	60	14
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Table 11 clearly indicates that students miss classes for a variety of reasons, health related reasons being only some of them. Should one use school attendance records then at all in evaluating the health status output of the Health Center?

b) Overall School Attendance

In trying to interpret Table 11 one realizes that school attendance is an indicator of general social functioning of the school age population. However, since OEO Health Centers describe their overall objective as enhancing the state of total social functioning of a target population, it can be concluded that OVERALL school attendance is a relevant output indicator of OEO Health Centers.

Any investigation using OVERALL reported attendance as an indicator necessitates, however, a careful design for controlling other influences. The ability of the teaching staff to attract students to classes and the activation of disciplinary codes to enforce school attendance are probably very strong factors of school attendance and have to be explicitly considered in future research designs. Since such a design will most likely involve an analysis across school districts, the availability of and the access to complete attendance records is a basic requirement for future research utilizing school attendance.

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c) Health Related School Attendance

A measure of OVERALL school attendance is, however, a weak proxy measure for evaluating the impact of investment in health care facilities on the physical health of the target population. Information on absence caused by illness and disability has to be collected specifically as reported in Chapter V.

d) Reflections on School Attendance

Although no specific cause-effect relationship between the Health Center and school attendance could be advanced, it was revealing to get an estimate of the magnitude of absences as well as to detect the lack of sufficient reporting of this rather important loss of economic resources.

To appreciate this loss, the average number of half days (38) missed by the eight grades in 1970-72 was expressed in percent of the approximate number of half days of attendable half days (270) during the reported period. It turns out that the average student missed about 14 percent of his school time. Put differently, the school district which finances the schools get only 86 percent of its spent resources to their intended use, i.e. provide formal education for the school age population. Whether this is a high or low figure can only be determined by comparative studies of different school systems, which requires extensive data and lies beyond the scope of this study.

1. John C. D
tion Syst
(1971), p

2. Robert W.
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Design,"
pp. 40-42

FOOTNOTES

1. John C. Deshaies and David R. Seidman, "Health Information Systems," Socio-Economic Planning Science, Vol. 5 (1971), pp. 515-535.

2. Robert W. Tuthill, et al., "Evaluating a School Health Program Focused on High Absence Pupils: A Research Design," American Journal of Public Health (January 1972), pp. 40-42.

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CHAPTER VII

RECOMMENDATIONS FOR FURTHER INVESTIGATIONS

The preceding chapters gave some indications of the problems faced in attempting an evaluation of a rural health care facility. Although the investigation was confined to rather limited subsections of the target population it was possible to gain some experience which will be useful in further studies on health care impact. This chapter presents the author's ideas on how he would organize future research efforts in evaluating health projects.

1. Summary of Problems

To put specific proposals into a perspective it is advantageous to reiterate the major problems encountered in this study and to propose some solutions to these problems.

a) Control of Variables

Role fulfillment of individuals is produced by a variety of individual and collective activities. Experience with this study indicated that there are three types of events which influence the production of health status. They are (i) differences in the services applied to individuals, (ii) differences in environmental conditions affecting health status and (iii) differences in the physiological and mental states of individuals. If we are interested in

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analyzing the health status impact of one or more of these events, we have to be able to keep the remaining events constant. To keep them constant we have to identify and measure them or assure that they are randomly distributed in both control and treatment groups.

In order to isolate the effects of the project from other effects is is necessary to employ proper techniques. Such techniques will have to involve three basic elements: (i) stratification of the population according to relevant variables which are measured before sampling, (ii) classification of the sample according to relevant variables which are measured after sampling and (iii) assurance of random occurrence of relevant variables which could not be measured either before or after sampling. The less able the researcher is to measure relevant variables the more efforts will have to be spent on assuring a random distribution of unmeasurable variables within each selected stratum or class and on assuring identical distribution of the unmeasurable variables between the selected classes.

Usually there is some information available on the amount and kind of health services consumed and on environmental conditions, yet there is almost no information available which would lend itself to a useful and operational classification of physiological and mental states of individuals. Yet since the effect of similar health services on health status will differ from patient to patient depending on his physiological and psychological state it is important to control for these states. If the population

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cannot be sufficiently measured according to those relevant characteristics of physiological-mental states it is necessary to design the "experiment" in a way which would assure an equal proportion of all states even if content is not known in both the control and the treatment group, i.e. by random assignment of people to each.

However, the disadvantage of such a design is that it forces the researcher to dilute his objectives. He cannot identify what effect health services have on various individuals with similar physiological states. He has to be satisfied with identifying the impact of particular health services on the total class or stratum of people. The only way he can be sure that he has a true control group is if there are identical distributions of physiological states both in the control group and in the treatment group. In order to get this assurance, it is necessary to randomly select both control and treatment groups from a common parent distribution or to attempt a measurement of the states which could prove that the two samples have the same known distribution of physiological states. Yet once the physiological states are known it is considerably more efficient to classify the sample according to these states and to attempt separate evaluations for each state.

Once it has been established that the distribution of unmeasurable characteristics is the same for the treatment groups it has to be assured that treatment is administered "evenly" within each treatment level. This implies that every unit within a particular treatment group gets the

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same amount and kind of treatment or has the same chance of getting the same treatment. To control the randomization of treatment it will be necessary to administer several identical treatments for each treatment group. A graphical summary of this procedure is offered in Figure 8.

The dilemma which the project evaluator faces is that he often deals with single projects and populations so small that the assumption of equal distribution of physiological states cannot be established even for the total population of controls and treatment groups. Random sampling of single control and treatment groups does not improve on the incomparability of distributions, since it would just result in the comparison of two samples which differ by more than the treatment, a situation which contradicts the assumptions of a controlled experiment.

The only way a health outcomes evaluation of a small population can be achieved under controlled conditions is by classifying the samples according to physiological and mental states prior to treatment. Considerable experimenting and close cooperation with medical professionals is called for in achieving such a classification of physiological and mental states.

b) Individual Role Adjustment

Specifying role fulfillment as a relevant output concept raises the questions of: "What are relevant roles?" The study suggests four major roles in relation to the age of the individual, i.e. play, school attendance, work, home work. Yet, experimenting with these groups shows

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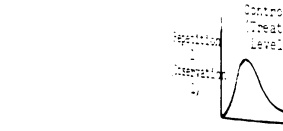
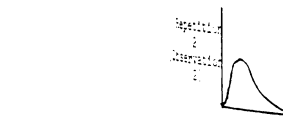
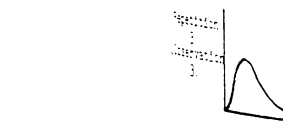
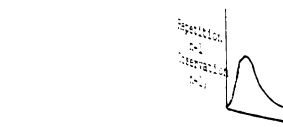
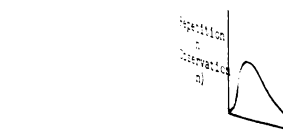


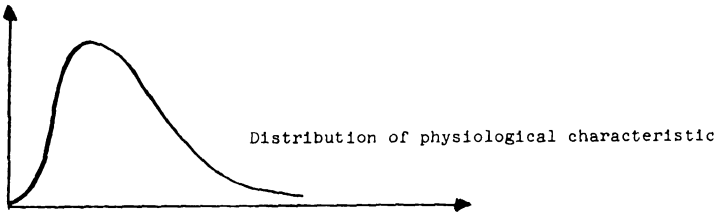








I. Parent population with particular distribution of physiological characteristics.



II. Division in control and treatment groups (across)

III. Repetitions of treatments (down)

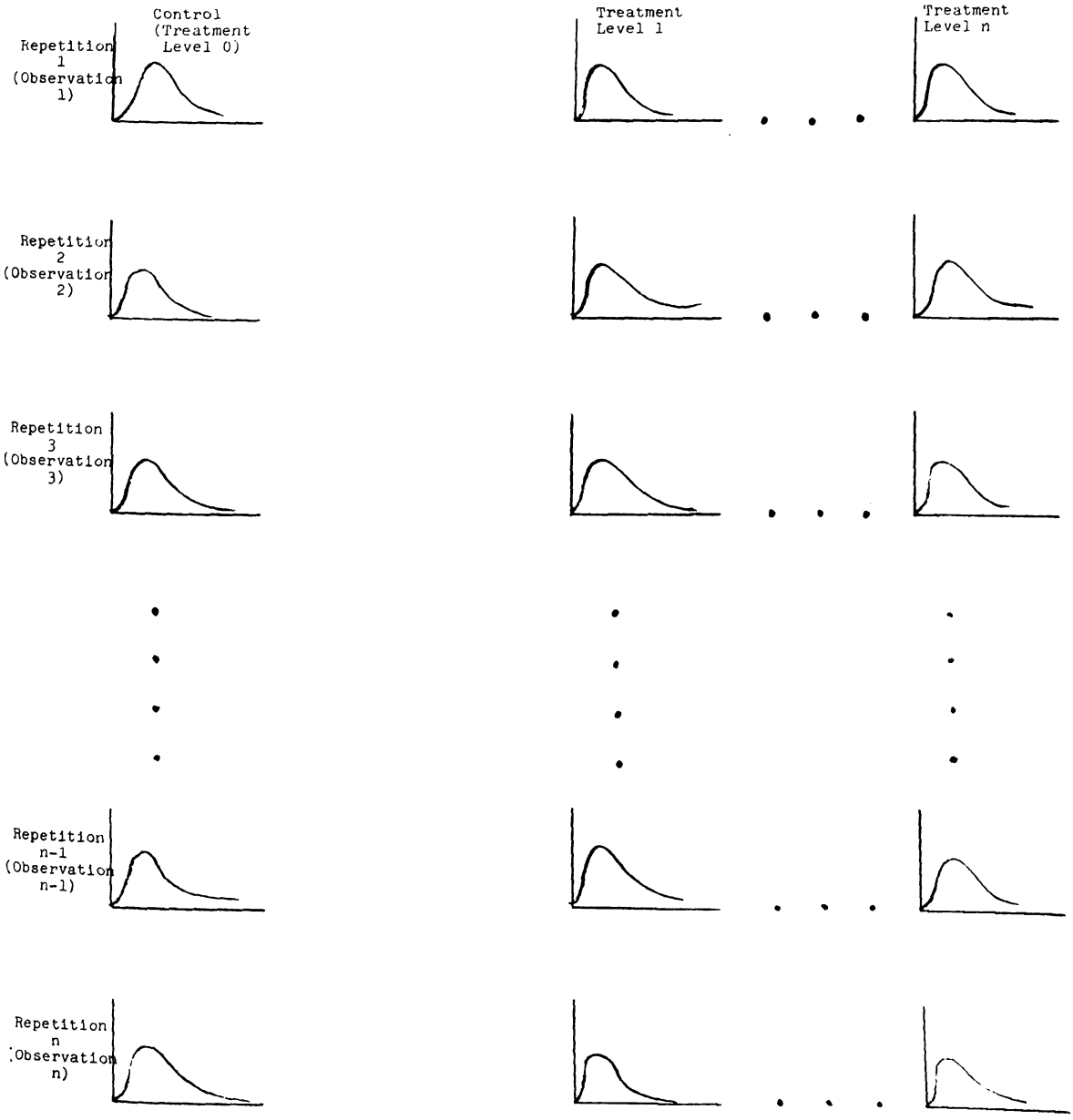


Figure 8. Steps of an Ideal Design.

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that there exists considerable variation of roles within each of the four groups.

The process of growing up and getting older is characterized by selecting and adapting to different roles. For instance, the parents of a preschooler who has a heart condition will report that their child is missing many days from his "usual" major role, i.e. play. Yet after several years of learning to adjust emotionally and physically to his weak heart the child has redefined his role and "usual" play is not any more his relevant role. The inability to play football on days when all his classmates play football "as usual" will not be reported by his parents as days missed from a major activity.

Similarly, an individual who is injured might report a substantial number of days missed from his "usual" work during the first weeks or months after his injury. As time progresses he will have received treatment and his injury will have been cured to some degree and he will report fewer days missed from his usual activities. Yet, he also might have redefined his role and report only days missed from his newly adapted role--however perceived. Many activity components which were vital in fulfilling his pre-injury role are irrelevant in fulfilling his new role. If he is able and willing to choose a role that does not require activity components which became unfunctional because of the injury, he will report fewer days missed from his role than if he would have refused to redefine his role. An injured football player might have to

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all his future games, yet, once he becomes coach he can "play" them even if his injury never heals. Similarly, an individual who lost a leg might not be able to plow a field with a pair of oxen but he probably could do the job easily and in a fraction of the time if he had command over a tractor. The fact that he lost his leg might turn out to be no limitation at all if he could choose as his new role the task of doing research on the utilization of tractors.

The preceding examples indicate that role adjustment is a product of a complex process determined by the following components: (i) the need for adjustment (if there were no external pressure requiring action there would not be a need for any action--neither cure nor adjustment), (ii) the availability of cure (if there were cure there would not be a need for adjustment), (iii) the availability of alternative roles (there must be a socially acceptable alternative to which the individual can turn, otherwise he will classify himself as being unable to fulfill his previous role), (iv) the feasibility of assuming another role (a role which is beyond the reach of the individual because of cultural, geographical or educational reasons is not an alternative).

The problems involved in evaluating health projects by means of role-fulfillment days are demonstrated by two related situations: on one side it is possible that two individuals with identical physical conditions and

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identical care, yet differently perceived roles, will report differing amounts of role fulfillment days missed. On the other side, it is conceivable that two individuals with identical health conditions and different levels of care will report identical amounts of role fulfillment days missed just because they perceive their role differently. The evaluator does not know whether more role fulfillment days are due to health services or due to better role adjustment. He does not want to give any "credits" to the health project which are actually "earned" by role adjustment which is unrelated to the project under investigation, or miss giving credit for role improvement (shift) caused by the project.

Health services seem to perform two tasks. Their primary task, as perceived by our society, is to aid the individual in striving for "ideal" roles. Their secondary task is to aid the individual in performing whatever role he has assumed well and comfortably. In other words, health services tend to affect role fulfillment more from the curative and preventive side leaving the task of role adjustment to other social institutions or to the individual himself. However, health services do have some impact on role adjustment through mental and medical treatment which allows individuals to adjust to new roles. Examples are artificial organs or psychiatric help in adjusting to new roles.

In the context of analyzing health projects, it is important to realize that both better role adjustment and

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better cure and prevention will result in better health status if measured in terms of role fulfillment days. Yet, the preceding discussion on determinants for role adjustment shows that role adjustment is called for only when it is (because of technology and costs) impossible to restore the physiological and mental state of the individual which enabled him to fulfill his previously specified role. There exists a trade-off between role adjustment and cure and prevention in terms of producing role fulfillment. Yet, role fulfillment produced through cure and prevention is often more highly valued than role fulfillment through role adjustment, because of the social preference for "ideal" roles.

c) Deviations from Ideal Roles--A Separate Output

The role fulfillment indicator does not measure this second objective, i.e. movement toward "ideal" roles. In order to get an indicator for this output it is necessary to get a measure of the kind and degree of deviations from the "ideal" roles. An analysis employing such an indicator of deviations from "ideal" roles will have to be standardized for age and occupational differences, otherwise it would be possible that a control group which is exposed to high occupational hazards might be compared with a treatment group which works under much safer working conditions. Resulting differences would be mistakenly attributed to the project.

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d) Quality of Role Fulfillment

Related to the problem of role adjustment is the problem of how painless or easy an individual can perform his role. Moving one's arm without discomfort is quite a different role fulfillment than moving it with pain. In the case of a bad arm the individual will probably attempt to adjust his role in such a way that he does not have to move his arm too often. But what can he adjust if his stomach hurts and nothing is available to correct this situation? He might still perform his major activities and fulfill his role, yet he fulfills it under pain. Only a qualitative indicator of role fulfillment will capture this potential output of health services.

e) Gestation Periods of Health Production

Most project evaluation is done on a short term basis and is often done mainly to facilitate "mid-course corrections."Administrators often perceive that they cannot afford to wait a whole generation before they decide on the merits of a project. Yet by its character, health care in one period affects morbidity and health status in later periods. Care during childhood may mean fewer problems as an adult. In order to have a basis for impact inference, it is necessary to have long run information on the reaction of health status under different institutional and production arrangements of providing health services.

The experience of this thesis suggests the need for time series and longitudinal data in understanding the long term effects of health inputs. Only this information

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will enable a confident evaluation of health projects. Such information is expensive and requires an evaluation period which is longer than most administrators are willing to want. However, there seems to be no shortcut to solve the gestation problem directly.

The only way the waiting period might be shortened is by utilizing experience from one study in designing the next study. Once we know more about the relationships involved we can refine the design and methodology of the analysis. Once we have a better methodology it can be hoped that the chosen indicators will become more sensitive and more reliable even in a shorter observation period.

f) Sensitivity of Indicators

Health production in developed nations is probably taking place already at decreasing returns to scale. Major gains are to be expected only in attacking the distributional imbalance of health status. But, despite the possibility of major returns by distributing health care more equally, it is very difficult to point towards any short term changes in health impact indicators which are attributable to particular projects.

Especially, ultimate output indicators change only after a considerable period of time. (Infant mortality and pain levels for some disorders are perhaps the only exceptions.) Intermediate output indicators such as particular indicators of health attitude and preventive

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practices react faster. Yet, as their name suggests, they are not the complete target of the health production process. Research is needed which establishes the relationship between intermediate outputs and health status. Once we know this relationship, we can rely on intermediate outputs as relevant proxy measures of the ultimate output and we can be confident that the search for alternative production methods is headed in the right direction.

2. The "Ideal" Experiment

The preceding discussion suggests that individuals be grouped according to the following criteria:

(i) age

(ii) roles

(iii) physiological and meantal state at the outset of experiment.

Each of the resulting cells has to be divided into a control group and treatment groups. The treatment (different levels and kinds of health services) will be evaluated by measuring the change in two output indicators:

(i) deviations from "ideal" roles

(ii) role fulfillment days

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3. Practical Considerations

Physiological and Mental States

Thus far only age and broad roles are identifiable. There exists no easily obtainable classification which

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would permit the investigator to group the client popula-
tion according to physiological and mental states. Yet,
it seems that such a classification could be achieved in
cooperation with medical researchers.[1]

The main target of such a classification will be
o assure the comparison of two similar individuals who
iffer only in the kind and amount of treatment received.
lthough such a grouping will still result in lumping dif-
erent physiological and mental states together it is a
esirable step since it reduces the variation <u>within</u> cells
nd enlarges the variation <u>between</u> cells--a feature which
haracterizes the controlled experiment. The remaining
auses of variation within cells has to be compensated for
random selection so the cells have identical distributions
the unclassified physiological and meantal states. Where
is cannot be done, causality is in doubt.

<u>Deviations from "Ideal" Roles</u>

As previously explained, this output indicator of
viations from "ideal" roles is important because it allows
to evaluate how well the health project performs its
mary task, i.e. to aid individuals in assuming "ideal"
es. The problem which the investigator faces is to
ntify "ideal" roles. "Ideal" roles are dependent on age
culture. It seems that the four basic roles (play,
ool, work, home work) have to be further refined in order
warrant the establishment of deviations. The refinements
have to consist of specifying various functions within

each role.

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each role. Such refined indicators will be similar to Activity of Daily Living (ADL) indicators which have been suggested for charting progress of chronically ill people. This study proposes to develop age specific activities of daily living indices for all individuals. To arrive at this information, it will be necessary to ask questions such as: "Can you play football?" or "Can you move your arm above your head?" or "Can you see this dot?"

It might appear that defining the deviations from "ideal" roles is the same thing as identifying physiological and mental states of individuals. However, it should be emphasized here that although the tasks to identify the two measures might be similar or even the same, they are aimed at two different things. Measuring the absolute physiological and mental state is an input measure, while measuring changed deviations from "ideal" roles is an output measure. Only the fact that we use some role measures and infer from them the physiological and mental states causes us to confuse the two concepts. Inferring from the role on the underlying physiological and mental state simplifies the definition of states but it introduces the need for more elaborate designs if one wants to establish causality between physiological states and deviations from "ideal" roles.

Classification of Health Services Inputs

Although health services can be more simply identified and measured than physiological states it has to be emphasized that their classification still poses serious problems. These

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problems arise mainly from the multitude and variety of inputs and input combinations applied to individuals. In order to establish production functions it is necessary to be able to show what impact a change in an input category will have on the outputs. In other words, inputs have to be scaleable or additive. Additionally, it is very difficult to handle all the different combinations of a multitude of inputs.

Most evaluation research has tried to overcome these problems by examining the impact of a few clearly defined programs and inputs on the conditions of individuals who were suffering from clearly defined categorical diseases, e.g. kidney diseases.[2]

Yet, in evaluating comprehensive health programs one realizes that the magnitude and variation of health service inputs is too great to warrant such an analysis. It will be hard to find individuals who have identical physiological states and have received all inputs in the same kind and magnitude with the exception of the one input under study.

The only way this problem can be solved is by decomposing health services inputs into their relevant attributes and observe how changes in the attributes affect outputs. Much future research and experimenting is needed to isolate relevant attributes so that useful input scales can be developed.

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4. Second Best Designs

The basic requirement of the "ideal experiment" is he measurability of physiological and mental states, refined ole categories and input scale. Such refined measurement nsures that the treated population differs from the control roup only in terms of identified treatment, i.e. we examine ole fulfillment of individuals in a specific physiological- ental state under specific treatment conditions and under ontrol conditions.

In reality we will not be able to completely identify nd measure the state of individuals at the outset of the xperiments. In order to make an analysis at all we will ave to group the population in such a way that we can ssume that both the control group and the experimental roup have reasonably identical distributions of variables hich have an impact on role fulfillment.

For instance, we have reason to believe that age, sex, ace and socio-economic conditions are correlated with ysiological and mental development. If we cannot identify ese physiological and mental states directly and use em as the basis for classification, we will have to be tisfied with measuring the variables with which they are sociated. Epidemiological and socio-medical research been concentrating on establishing these relationships should, therefore, be tapped to facilitate classifi- ion of individuals in further studies.

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a) Social Experiments

It is possible to organize an experiment which would randomly divide a population into a control group and a treatment group. The treatment group would be enrolled in a Health Center and the control group would not be enrolled in the Health Center. In order to assure control it is important to ascertain that control is maintained throughout the course of the experiment. The objectives of the study will determine how the experiment has to be controlled. If we are interested in identifying whether the enrolled group produces more role fulfillment days than the not enrolled group, we will be satisfied by comparing the control and the treatment group before and after the experiment. However, such an evaluation does not control for the possibility that the control group might have received similar treatment from other sources.

Therefore, if our objective is to evaluate treatment we have to control for variations in treatment. The only way such an evaluation can be organized is by classifying and measuring health services inputs in the treatment group and in the experimental group. It will be comparatively simple to obtain this information on the treatment group, because they can be observed through the project. Yet, it is rather difficult to obtain this information from the control group unless it is observed on purpose.

b) Ethical Dilemma of Health Experiments

This raises an ethical question on health services experiments. Why should one person get treatment because

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he is in the treatment group and why should an "identical" person be denied the treatment just because he is in the control group? It also raises the question of the feasibility of such experiments. If the value structure of our society objects to the notion of human guinea pigs it is impossible to conduct truly controlled experiments.

It should be noted, however, that resources for health care are limited and some are excluded in fact. Controlled experiments do not necessarily mean that more people are denied care than in the absence of experiments, but only that the denial be randomized.

c) Inferences from Existing Differences

Given limitations on human experiments the researcher has only one alternative open. He can observe existing differences in classes of individuals and health services and can infer a production relationship from this information to the best possible extent. If research is successful in establishing an accurate classification of health services and physiological states, production relationships can be established by observing the variation within one project.

Experience with this study indicates that especially the classification of physiological and mental states will require considerable improvement. While we lack such classifications we will have to make do with observing the impact of different health services inputs on groups of individuals who have similar (or ideally identical) distributions of physiological and mental states. The only way to assure

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this situation is by classifying and stratifying the population as well as we can into cells (e.g. age, categories). Then, by increasing the number of sampling units within each project area and by increasing the number of identical projects we increase the probability that the distribution of remaining unmeasurable variables are identical among all cells.[3]

5. A General Strategy for Evaluation

The preceding discussion and experience gained during this study indicates that it will be very difficult to group individuals into a sufficient number of physiological and mental states. Similarly, it is very difficult to indicate the kind and quantity of health services consumed by various groups of physiological states. Thus, the researcher has insufficient knowledge about the units on which he makes his investigation and he has insufficient knowledge about the treatment given to the units.

One way to overcome bottlenecks which are caused by lack of measurability is to resort to proxy measures which are easier measured. This study suggests utilizing the availability of health services in the project area and the consumption of services by various groups (e.g. age groups) within the projects as proxy measures for health services applied to individuals with particular physiological and mental states. However, to make availability and consumption of health services relevant proxy variables, it is necessary to stratify and classify individuals according to

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socio-economic and "other" measurable characteristics which are related to or causative for physiological and mental states. Thus socio-economic and "other" variables are proxy variables for physiological and mental states. Since many extreme physiological and mental states are only sporadically distributed, it will be necessary to deal with sufficiently large cells or adjust the analysis for these extreme cases, which, because of their extreme character, might be easier identifiable than the more regular variations in physiological states.

The preceding paragraph indicates that the problem of insufficient knowledge about the distribution of physiological states can be partially overcome by insuring equal distribution of such states between control and treatment groups. The problem of insufficient information on health services can be overcome by disaggregating services into attributes and observing attributes. These guidelines lead to the following generalized strategy for evaluation:

(i) Stratify and classify individuals according to socio-economic data (and physiological and mental states where possible).

(ii) Assure an equal distribution of unmeasurable characteristics of individuals by making the number of individuals per cell (in a given project) sufficiently large and by including a sufficient number of projects in the analysis.

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(iii) Identify health services inputs consumed by both the control and treatment groups (sex, age, race classifications, etc.) and classify them according to attributes.[4]

(iv) Identify health services available to the various project areas by classifying health services according to attributes of mix, kind, quantity and institutional arrangement of medical care production and delivery.

It should be emphasized that the proposed strategy attempts to improve control by observing both health care consumed by individuals and health care available to the individuals. Such an approach will insure a reduction of variance of measurable variables between treatment cells and an increase in the similarity of the distribution of unmeasurable variables between control and treatment cells.

A graphical representation of establishing the desired production functions for the health services input-output relationship is offered in Figure 9. Figure 9a shows the health status production function of a particular group of individuals who have the same amount and kind of services available to them. Figure 9b displays the health status production function of individuals with particular demographic and physiological characteristics under increasing availability of health services (regardless of individual consumption). Figure 9c combines the two factor-product functions into one single production function which could be estimated by regressing health status on the two different forms of health services (available and consumed).

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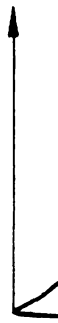

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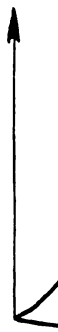
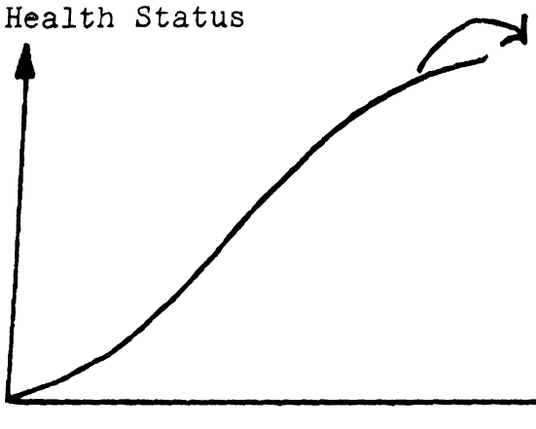


c) Health

Figure 9.

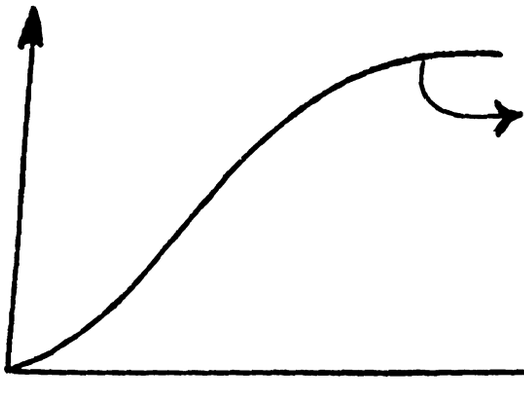
a) Health Status



Health status production function of a group of individuals with particularly demographic and physiological characteristics who have identical health services available to them.

Quantity of health services consumed (grouped according to attributes).

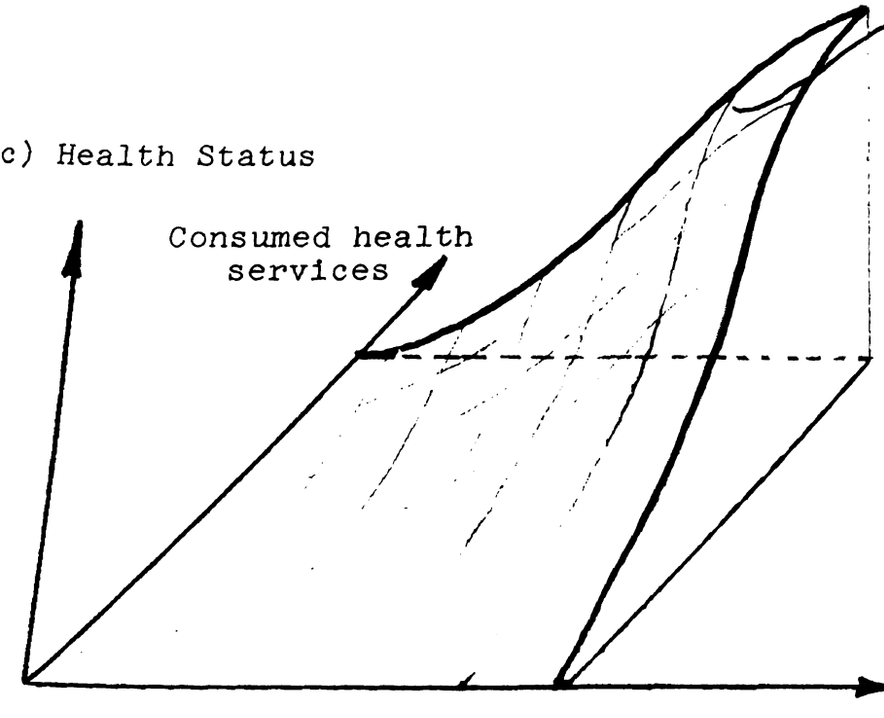
b) Health Status



Health status production function of a group of individuals with particular demographic and physiological characteristics who have different health services available to them.

Quantity of available services (grouped according to attributes).

c) Health Status



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Similar functions can be established for all groups of different demographic and physiological characteristics.

From the preceding discussions it becomes apparent that the more we know about health services and about the individuals to whom they go the less will the variable of available health services influence the health status. The less we know about the individuals and the health services they get, the more will the variable of available health services influence the health status mainly because it becomes a proxy for care consumed. The acceptability of this proxy will increase with increasing population and sample size of the examined groups.

6. Specific Proposals

The generalized strategy will have to be adapted to specific research situations. Two such situations are briefly outlined here.

a) Utilization of Available Census Information

The National Health Survey instruments collect health related information throughout the United States. The procedure applied to arrive at the information is that of a

> "highly stratified multisage probability design. In the first stage, primary sampling units (PSU's are selected from a universe of 1,900 such units which are geographically defined and which collectively exhaust the territory of the 50 states and the District of Columbia. Each PSU consists of a standard metropolitan statistical area (SMSA) or one or two contiguous counties. In a series of successive sampling steps, there is selected a final sampling unit which consists typically of a cluster of 6-9 neighboring households, called a "segment." Data are secured, mainly through personal interview, for each member of these sample households. The design makes each

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week's interviewing a probability sample of the entire United States, and weekly samples are additive in the sense that they can be combined for 13, 52, 104, or more weeks."[5]

Applying the generalized strategy to these data would require the PSU's to be grouped according to availability of health services attributes and according to socio-economic characteristics of the sampled population. Output measures (days missed from roles, deviation from roles, i.e. chronic disability) can be obtained from the Health Survey interview.[6]

The results of such analysis would indicate how successful different levels of health service attributes were in affecting the output indicators: role fulfillment and role deviation. From this information it will be possible to draw conclusions on the impact of certain public programs and projects which were in effect during the years the Health Survey was taken (approximately during the past 15 years).

It should be emphasized that the presented suggestions are only speculative at this state since a detailed investigation of the survey procedure was beyond the scope this study. Further research and close cooperation with e National Center for Health Statistics is required before such a project could be launched.

Utilization of Newly Collected Information

The information desired in the generalized strategy d be collected in several communities throughout the or the country. Since it will be difficult to get

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data on physiological conditions and health services consumed, it is suggested to obtain this information on small but carefully selected samples and infer from this information on the distribution of these characteristics throughout the populations of interest.

Since such a study will have to be undertaken over several years and since the American population is extremely mobile it will be necessary to control for population shifts. Experience gathered in local data collection efforts, such as in the New Haven Census Use Study, will be of great help in observing communities over time.[7]

7. Further Improvements of the Model--A Dynamic Model

Since the researcher will usually enter the health production process in the middle of the individual's life and because of the previously discussed gestation period, it is advantageous to relate inputs and outputs by dynamic model which will handle feedback and other time related properties of the health production process. Such a model can be conceptualized by the following equation:

$$H_t = f(H_{t-1}, HSC_{t-1}, HSA_{t-1})$$

where:

(H) = health status of a particular population group (e fulfillment deviation)

(HSC) = health services which are consumed by a cular population group

(HSA) = health services which were available in the ity.

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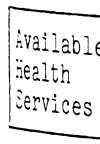

Figure 10.

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The subscripts indicate that the health status of period (t) is a function of the health status in previous periods and of health services which were available or consumed during previous periods. The feedback mechanism described by the preceding equation can be represented by the following block diagram.

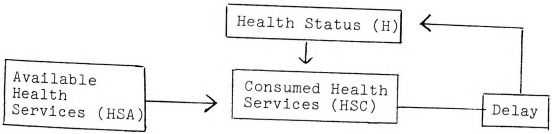

Figure 10. Dynamics of Health Production

The flow diagram shows that health status is both a measure of need in one period and a measure of success in another. As a measure of need it determines (in connection with the availability of health services) kind and quantity of services which will be consumed. As a measure of success it indicates the output of the consumed health services which was either produced directly or through intermediate outputs. Delay functions represent the delay (gestation period) between the administration of inputs and the appearance of outputs.

8. Data

The empirical work undertaken in this study showed that data systems are not complete at best and usually not available at all. Data collection is expensive and complicated.

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Cooperation with community organizations and simplifications of the collection procedure are necessary requirements for successful research.

a) Attributes of Health Services

Research is needed to identify relevant attributes of health services. Only such a classification will enable us to combine and add health services analytically and conceptually even if they are non-additive in their physical state. Furthermore, grouping health services according to attributes will make systems analyses manageable. (Research on combinable attributes of certain health services could be done in the format of several M.S. theses.) It should be emphasized that the health services attributes of other private or public activities (nutrition, community organizations, family structure, etc.) should be included in such an analysis.

b) Physiological and Mental States

Cooperation with medical research is called for in establishing a manageable and relevant classification system. Much of the experience of public health research and epidemiological research has to be incorporated in this kind of investigation.

c) Health Services Outputs

Role Deviation. Cooperation with other social sciences and with medical sciences is necessary to establish a more refined classification of roles. As previously indicated, research is needed to identify degrees of deviation

from ideal roles. Chronic disability states as used in this study are only imperfect measures of role deviation.

Role fulfillment. This indicator will follow the procedure described in this study by identifying days missed from the individual's major roles.

Mortality. The usual procedures of calculating and analyzing mortality rates give satisfactory results.

d) Intermediate Output Indicators

Since many health projects attempt to affect changes of behavior and environmental conditions which might have impacts on health status, it is recommended to further improve the collection and analysis of this information. However, the relevancy of these data as intermediate output indicators can be determined only by examining their impact on health status.

9. Data Collection

a) School Data

School boards in the selected communities can be asked for cooperation in organizing and maintaining attendance records. Once the school boards and the school administrators realize that these records will be used they will probably exert more care in documenting the information. The usefulness of school attendance records for evaluating education and schooling should make the additional efforts worthwhile even to the school administrators.

In order to be able to utilize school attendance data as output indicators of health projects, it is necessary to establish the relationship between health related and health

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unrelated reasons for absence. A carefully selected sample of the school age population will give sufficient information on the distribution. Once this sample distribution is known it can be inferred on the total school population and health related absence can be calculated for the total class or school or for any specific group of school children.

b) Survey

The survey reported in this study suffered from recall problems. Further investigation should employ a much shorter recall period (four weeks) than the ad hoc comparison (one year). The procedure could be a modification of the one established by the Health Survey Interview and the New Haven Census Use Study.

The sample could be divided into four sub-samples. Every three months a sub-sample could be interviewed and asked to report health conditions over the preceding four weeks. Such a procedure is the least expensive way of i) interviewing the whole sample only once every year and ii) still capturing seasonal trends in sickness and activity limitations. Resource constraints will determine the size of the sample and into how many sub-samples it would be divided. Experiments will have to be made to determine whether the procedure would not be equally reliable if sub-samples could be asked to report their health status by phone. The trade-off between (i) shorter recall periods and phone interviews and (ii) longer recall periods and personal interviews has to be established. Research by the National Center for Health Statistics might be directly

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10. Questionnaires

This section offers a brief discussion on how experience gathered in this study could be utilized in future studies of health impact evaluation. (A full treatment of the problems of constructing questionnaires for heath evaluation research is, however, beyond the scope of this study. The reader is referred to the publications of the National Center for Health Statistics for detailed treatment of these problems).

a) Deviations from "Ideal" Roles

This study used chronic limitations as a proxy for deviations from "ideal" roles (see questionnaire items 14-16, 19-22, 34-36, 38-40). To give the interviewer a check on whether the respondent has understood the question correctly, several questions (items 8-12) were asked as an introduction.

It is recommended to expand this introduction and to include some objective questions on health conditions. These questions might be function-oriented, such as: "Can you move your arms over your head?" or disease-oriented, such as: "Have you had malaria?" or treatment-oriented such as: "Have you been treated for malaria?" Research on the Health Survey Interview which includes many similar questions will have to be reviewed to come up with acceptable questions. Once suitable questions are selected it will be necessary to combine answers to these questions with answers from the questions on limitations in arriving at valid indicators of deviations from "ideal" roles.

Confusion Between Role Fulfillment and Role Deviation

The questionnaire of the ad hoc comparison attempted classify the respondent into one of the five chronic nitation groups: (1) need help to move around, (2) unable do major activity, (3) limited in kind of major activity,) limited in amount of major activity, (5) no limitations all. The objectives of the questions were to isolate viation from ideal roles from role fulfillment. These dif- rences were not communicated with sufficient precision in e questionnaire used here. Therefore, after limitations n kind" or "in amount" have been established the follow- ; question should be asked: "On how many days did illness injury keep you from that kind of activity (play, work, .) which you should be able to perform even with limitation?"

Fulfillment of Roles

Questions 17, 23, 41 and 42 asked for the number of s missed from roles. If these questions are asked over nort period of time (and include the change suggested the preceding paragraph) they will be sufficient for aining an indicator of role fulfillment.

Fulfillment of Two Roles

This study specified two roles from the school age lation (play and school) and the working age population ework and work).

It seemed that respondents did not always separate the events and gave the same or conflicting answers, for days and home work days. For instance, many respondents ted that they missed two weeks (14 days) from work,

when further probing indicated that they actually missed only 10 days from work and were limited in their home work during the four additional weekend days.

The interview administered in this study showed that the kind of occupation determines whether an individual will miss more work days (on the job) than home work days or whether he will miss fewer days than home work days. Although no organized analysis of this phenomenon could be obtained, it seemed that individuals who have jobs demanding hard physical efforts would miss more work days on the job than at home. In other words, they were too sick to work on the job, but not too sick to do the usual home work. On the other hand, individuals who had less strenuous jobs would miss more home work days than work days on their jobs--i.e. they could do their job but needed rest time at home and were, therefore, unable to perform their home work. Children seemed to be often too sick to go to school yet not sufficiently sick to reduce their play activities significantly.

It was evident that the two roles were not the same for most individuals. Yet, by requiring the respondents to recall events over a long period of time (one year) much of the differences were not reported at all or in an incorrect manner. It appears that in the case of a long recall period, there is very little gain in asking the working population and the school age population about their fulfillment of two roles. Further experimenting is necessary to determine a recall period which is short enough to enable the respondent to recall how he or his family members fulfill two specific roles.

e) Work Loss Not Related to Health

Further experiments are necessary to make questions (24-31) of the member questionnaire more suitable for an investigation. It seems that combining self-employment and outside employment in one question causes unnecessary confusion and reduces the reliability of the answers. Many respondents said that if they are not outside employed they are fully self-employed at home, thus resulting always in a full time total employment even when some of the time was non-productive.

It appears that dividing the questions into questions on work and questions on home work serves to treat self-employment sufficiently. Dividing self-employment into further categories does not produce additional benefits. It is, therefore, suggested to apply questions (27-31) to outside employment only and to adapt the questions to the selected recall period.

) Environmental Information

The household questionnaire of this study offers some nsight into what questions should be asked to classify the ndividual's environment. The regression results indicate hat length of residency in an area, nutrition, availability f health care and education of the head of the household fluence health status most significantly. However, further udies must establish whether these environmental variables uld not be captured by relying on income differences exclu-vely. This study eliminated income differences to a large tent by concentrating on the food stamp and Surplus Commod-y recipient group.

11. Sampling Frames

The following records should be examined for their suitability as sampling frames:

Census sampling frame. Attempts should be made to obtain access to the sampling frame used by the National Census. Although most of the Census information is inaccessible to non-governmental users it might be possible to get access to information which is useful in establishing a sampling frame. (This thesis did not investigate the feasibility of such a procedure.)

Michigan Health Survey (Project ECHO). The Michigan epartment of Public Health investigates the incidence of nvironmental conditions in its ECHO Survey (Evidence of ommunity Health Organization).[8] One of the phases of the urvey consists of locating all residences of the survey rea. The proposed study could be based on a sampling frame rived from the Michigan Health Survey, wherever such a rvey has been taken. Should the proposed study concenate on communities which are not included in the Michigan alth Survey it would be possible to attempt to utilize e procedure devised by the Michigan Department of Public lth. The major disadvantage of this approach is that does not differentiate between permanent and seasonal idences. However, a differentiation between the two is remely crucial in surveying an area which has many sonal residences--a prevailing phenomenon throughout thern Michigan.

Postal Addresses. The fact that most rural addresses

are listed by rural route or postal box makes this a less desirable tool than it might appear on the surface. Yet, postal boxes and rural routes pose no problem if the survey is handled by mail.

Phone Directory. The most significant disadvantage of this approach is rooted in the correlation between income and the access to private telephone services.

Utility Bills. Power companies keep files on industrial and non-industrial users. Furthermore, they divide their records into those of seasonal and year-around customers. This division constitutes a considerable advantage in tourism areas.

Plat Book. Each county has usually an organization which sponsors the publication of a plat book. This plat book lists names of house and property owners and references them according to their position on a map. The plat book constitutes a sampling frame of the population that owns property yet it leaves out non-owners. Yet, non-owners may be heavily represented in that part of the population that is to be interviewed.

Court List. Judges keep lists of area citizens upon whom they call for participation in juries. Cooperation with the courts is necessary in order to get access to this usually unavailable information.

Lists of Population Groups. If the survey addresses a particular population segment it is sometimes possible to find an existing list of this group. An example is the use of the population receiving food stamps as a proxy for

the low income group as demonstrated in this dissertation. Similarly, one can use school records as the basis for investigating the population with school age children. The matching of various lists could result in the establishment of a complete frame, yet it usually creates more problems than it solves.

12. Interviewing

Since the questionnaires are sufficiently simple it would be possible to obtain answers first by mail and interview non-respondents personally at a later time. To facilitate such a "mixed" interviewing procedure it is necessary to establish kind and magnitude of reporting bias arising under the different procedures. Interviewers could be local residents who have received sufficient training or full time "itinerant" interviewers.

Reward for Participation. Experience in the ad hoc comparison indicates that most respondents feel bothered by the questions. The knowledge of doing something "for the society" constituted the only incentive to participate. It is suggested to offer the respondents of future surveys some kind of a personal reward. One way of rewarding the participants would be to offer them useful publications of the Extension Service as an immediate reward for answering the questions. Such a procedure would fulfill at the same time an Extension function--if the publications are selected appropriately. Distributed publications should be attractive and of immediate relevance to the respondents, such as brochures on gardening, nutrition, sewing, etc.

13. Long Run Perspectives

Future studies will have to be reformulated and reorganized several times. Experiments with questionnaires will finally produce an acceptable survey instrument. Once such a stage has been achieved, it is possible to attempt a formal cooperation between the selected communities and the University which would result in a division of labor. The communities would be responsible for collecting the information and the University would be responsible for organizing, supplying and interpreting the information as required by the communities. It can be expected that other indicators will be developed simultaneously with the health status indicators. The availability of numerous indicators will warrant an elaborate computer and storage system for these data. Experience gathered through efforts such as the TelFarm system at Michigan State University will be a valuable guide in developing such a system. The clients of the proposed system would be communities instead of individual entrepreneurs.

14. Project Evaluation--A Summary

The preceding discussions indicate the problems encountered in project evaluations. The long gestation period of health projects and the need for control are probably the two areas which will pose the most difficult problem to future research. As indicated in the discussion on ethical problems of human experiments, our social values object to giving one person care and denying it to the other.

This ethical foundation is also reflected in our political process. We do not want to admit that we give special health services to underprivileged families in one community and deny it to underprivileged families in another community. Yet, our "ideal" experiment would suggest just this. In reality we see that social demonstration projects are political pawns and if one community gets a special OEO health project, other communities will demand "their" projects on grounds of equality.

How can social production function research be accomplished with constantly changing inputs, lacking controls and long gestation periods of production? No certain answer can be given. Yet, this chapter on recommendations for further studies should be concluded by emphasizing that the long run examination of physically observable health services inputs will not be feasible because of the changing physical nature of these inputs. Only a disaggregation of services to attributes and an examination of these attributes will make a long term production function analysis possible. And health status production can only be analyzed over a long time--longer than most of our past projects have been in existence.

FOOTNOTES

1. A grouping of this kind may involve an implicit choice of a common denominator in order to warrant some kind of additivity of different diseases and conditions.

2. U. S. Department of Health, Education and Welfare, Public Health Service, Benefit-Cost Analysis of Kidney Disease Programs (Washington, D.C.: Government Printing Office, 1968).

3. This assumes that there is no systematic self-selection by patients and/or no systematic selection by program administrators.

4. The term "attribute" refers to the discussions in Chapters II and III.

5. U. S. Department of Health, Education and Welfare, Public Health Service, Health Survey Procedure: Concepts, Questionnaire Development, and Definitions in the Health Interview Survey, Vital and Health Statistics, Series I, No. 2 (Washington, D.C.: Government Printing Office, 1964).

6. U. S. Department of Health, Education and Welfare, Public Health Service, Age Patterns in Medical Care, Illness, and Disability, Vital and Health Statistics, Series 10, No. 70 (Washington, D.C.: Government Printing Office, 1972), pp. 76-88.

U. S. Department of Commerce, Bureau of the Census, Census Use Study, Report No. 12: Health Information System-II (Washington, D.C.: Government Printing Office, 1971).

Michigan Department of Public Health, Michigan Health Survey: Reference and Procedures Manual (Lansing, Mich., 1970).

CHAPTER VIII

SUMMARY

1. Rural Health Care

Recent years have witnessed a dramatic decrease in the vailability and quality of health care in rural areas. ifferent groups have advanced various explanations for his decay of what once seemed to be an adequate system. he most important causes are believed to be the concentra- ion of medical professionals in densely populated and high ncome areas, restriction of entry into the medical profes- ion through alledgedly outdated licensing procedures and he medical profession's interest in highly advanced surgi- l procedures necessitating large and costly hospitals. e resulting abundance of specialists and the lack of neral practitioners has upset health services consumers d has received considerable political attention.[1]

Federal and state agencies have been experimenting with ternative institutional and service arrangements in solving e American "health crisis." Yet, so far very little is wn about the impact of programs on the health of the get populations. Like in other areas of public spend- , health project administrators have a fairly good idea what they put into their programs, but lack information he socially relevant and desired outputs. Most of the

output measures used indicate how efficient an organization is in providing "units" of care, yet they do not tell how efficient those services are in producing health and changes in activity levels of people.

Experience and intuition cause administrators to assume a positive correlation between the inputs (units of care) and the outputs (health). Very little factual knowledge is available to support or dispute their assumptions. However, if administrators try to establish a formal relationship they realize that they face a two-fold problem. One is to identify what the socially relevant outputs are and the other is to find a way how to measure the output. This thesis attempts to provide some insight into the problem of output identification and measurement of public projects in general and of health projects in particular.

2. Conceptual Framework for Evaluating Social Projects

Economic theory provides the basic framework for evaluating input and output relationships of public projects. Yet, what is output of one production process is input into another production process. Focusing on an irrelevant process will produce irrelevant conclusions. For instance, it may be important to find out whether organization A produces hospital beds more efficiently than organization B and whether organization A produces doctors less efficiently than organization B. But, as long as we do not know whether hospital beds produce more health than doctors or which combination of the two produces more health, we are concerned with irrelevant

information. The notion of "Derived Demand" indicates that the demand for many goods is derived from the goods they actually produce. The "New Theory of Consumer Demand" expands on this and shows that the same derived demand situation is applicable to our consumption pattern. We demand goods not because of themselves but because of their several attributes which we desire.

The thesis suggests that these two theoretical concepts be used as a guideline for arriving at relevant input-output relationships. The concepts urge the evaluator to break down the input-output chain into its relevant components by asking questions such as: "Why is this product (service) demanded?" and "What are the inherent attributes of the product (service) which make this product valuable to the consumers?"

It should be emphasized that the thrust of this dissertation is to <u>first</u> identify the relevant relationships and <u>then</u> cope with the measurement problem--and not the other way around.[2] Once relevant relationships have been defined, it is the task of the investigator to find out which of the variables cannot be measured at all given the present state of the art. The remaining variables will be measured directly or by relevant proxies.

3. Application of Concepts to Health

a) Outputs (Health Status)

The proposed conceptual guidelines resulted at first in identifying "health" as the relevant output. In attempting

to measure health it turned out that by applying the "New Theory of Consumer Demand" one realizes that "health" too, is not demanded as an end in itself. Rather, the individual's desire for being able to fulfill his role in society causes him to demand health. It was, therefore, decided to measure health status in terms of its attributes, i.e. as role fulfillment.

Several role fulfillment indicators could be conceptualized. For practical purposes, only a few could be selected. The chosen indicators were measured in terms of their absence and were expressed in the following way:

(i) Days lost from work because of health reasons.

(ii) Days lost from home work because of health reasons.

(iii) Days lost from school because of health reasons.

(iv) Days lost from play because of health reasons.

The use of role fulfillment indicators poses several conceptual problems. The process of growing older is characterized by selecting and adapting to different roles. Once people have adjusted to a certain role (e.g. working slowly or not performing manual labor), they will report only days lost from fulfilling their new roles. Yet, there exists a social preference for "ideal" roles. Since the attainment of "ideal" roles constitutes another objective of the health production process it has to be included in an evaluation of health services.

Because of the difficulty of defining "ideal" roles it was decided to use the following proxy indicators:

(i) Needs help to move around inside and outside the house.

(ii) Cannot fulfill his role (play, school, work, home work), at all.

(iii) Limited in the kind of his role fulfillment (i.e. cannot work in a factory).

(iv) Limited in the amount of his role fulfillment (i.e. cannot work as many hours as before).

) Inputs (Health Services)

One of the major problems of any evaluation is the classi- fication and grouping of inputs. In evaluating health pro- ects one faces a multitude of different health services nputs. How should one treat them in an analysis?

This study suggested to apply the concepts of the "New heory of Consumer Demand" also to the problem of identify- ng input classes. Such a procedure would disaggregate ealth services or activities and goods producing health nto relevant attributes, (e.g. preventive, diagnostic, reatment, skill level of providers, etc.) and base the alysis on these attributes. Once the input-output rela- onship between attributes and health status has been tablished it is possible to use prices as a guideline for termining which health services and goods should be used the production process. Because of resource and time itations it was decided to concentrate in this study on lth status outputs, and to pursue the identification measurement of inputs only marginally.

Resource constraints precluded an indepth analysis of the input side of the attempted input-output analysis. Yet, some experimenting with existing data was undertaken. Particularly the question of number of services consumed was of interest to this investigation because such information constitutes the cornerstone for a complete production function analysis.

Since most input data are reported in terms of health services per unit (patient) it was of interest to get a measure which would indicate how evenly the inputs were distributed among the units. Appendix A describes the analysis of concentration of health services inputs supplied by the Health Center. Lorenz curves and Gini coefficients are suggested as considerable improvements over the existing methods of reporting averages only.

4. Empirical Analysis of Health Status Outputs

Once "role fulfillment" and "role deviation" were established as the major "ultimate" output indicators of health services it was decided to apply these concepts in the case of a rural health project located in Northern Michigan. (The Western Michigan Comprehensive Health Services Project with its main clinic in Baldwin (Lake County) serves people in an area consisting of the four counties of Lake, Mason, Manistee and Newaygo.)

Since the major objective of this part of the study was to examine the feasibility of measuring health status output it was decided to limit the evaluation to segments of the

population. The empirical study explored two approaches for obtaining data on health status output: a survey and existing records of school attendance.

Attempts to establish an experimental design as the basis for the "health status output" survey showed that treatment units have to be classified according to physiological and mental states in order to accomplish a "with and without" analysis. Lacking feasible procedures to measure the physiological and mental states it was decided to resort to an "ad hoc comparison" which compares the treatment group with a comparison group that resembles the treatment group in all characteristics with exception of the treatment, i.e. health services.

Basing the matching of treatment and comparison group on regional, local and personal socio-economic characteristics, it was decided to compare a sample of Lake county food stamp recipients with a sample of Montmorency county (Michigan) Surplus Commodity recipients.

In developing the questionnaires for the survey it was decided to utilize questions of the National Health Survey to the greatest possible extent. The main reasons for this strategy were lack of experience in establishing health related questionnaires and the desire to have comparable data. Although no comparison between national data and those of this study was attempted it was felt that such reports would be desirable for future (and preferably more complete) surveys for which this study would be the initial step.

The heads (or the spouses of the heads) of 84 families were interviewed in each county when they came to pick up their commodities or food stamps. The respondents would answer questions about their household, their health and about the health of each member of the household. Although there is a considerable recall problem with health interviews about periods which extend longer than two weeks in the past, it was necessary to ask the question with reference to the whole past year in order to facilitate a statistical analysis of the collected information and to avoid seasonal variations.

An analysis of the data indicated that the Lake county sample missed fewer days from play, school, and home work and more days from work than the Montmorency county sample. (Not all differences were significant at the 10 percent level however.) The fact that Lake county individuals have less work opportunity (unrelated to health) tend to make the difference in work days missed even more severe.

A regression analysis established that other variables (nutrition and level of education of the head of the household) had some, yet not conclusive, impact on role fulfillment. Confining the analyses to a specific income group (commodity and food stamp recipients) controls probably necessary for a variety of other health related variables. An investigation over the total income range is necessary to find out whether income would be a sufficient proxy for satisfying the population according to health related variables other than health services consumed.

A comparison of "role deviation" indicators showed that the Lake county sample (treatment) had more individuals in categories of severe limitation than the Montmorency sample (comparison). Since these indicators can only gauge longer term changes it was decided not to use them for an evaluation of the Lake county project which had existed not more than five years. The "role deviation" indicator is, therefore, a social indicator and not a "program output coefficient" as defined in this study. However, the "gestation period" of health production is not only a problem in utilizing "role deviation" indicators but also (though to a lesser degree) is dealing with "role fulfillment" indicators.

The other major empirical investigation consisted of examining school attendance records of the Baldwin School district. Several different procedures were utilized to expose differences between students who were enrolled in the Health Center and those not enrolled.

The major advantage of this investigation as compared the survey was availability of recorded data both for the "before" and the "after" project period. However, concentrating on classes within the project posed several design problems. Control could be considerably improved utilizing the procedure employed in this study in an "ad hoc comparison" or in more elaborate designs suggested this research. The investigation of the limited number Lake county school classes did not give any basis for firming or denying the production of health status output the Health Clinic.

5. Concluding Remarks

The emphasis of this study was on methodology and conceptualization. It was possible to develop a theoretical framework for evaluating public projects, particularly health projects. The research succeeded in isolating relevant health output concepts and identifying suitable measures to collect the desired information. An application of the developed concepts and measures to the evaluation of a particular rural health project did not provide enough evidence for clearly assessing the impact of the project on activity levels (role fulfillment) of the examined poverty group.

However, a major result of this thesis, as presented in Chapter VII, is the experience gained in survey concepts and design which can be used in future investigations.

FOOTNOTES

1. John Walsh, "Medicine at Michigan State (1): Education and Legislation," Science, Vol. 77 (1972), pp 1085-7.

2. Relevancy is ultimately a political decision but analysis can provide inputs for that process.

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APPENDICES

APPENDIX A

APPENDIX A

HEALTH SERVICES UTILIZATION AND MEASURES OF CONCENTRATION

An increasing amount of literature has appeared during the last decade pointing to the fact that different population groups enjoy different standards of health. The health status of a population has been usually measured in "negative" terms of death and morbidity. Only recently efforts have been extended in measuring day-to-day activities which can be performed by the individual or by a group of individuals--in other words, a more "positive" measure of health status.

Since all these outcome measures of the "health production process" impose the numerous conceptual, methodological and empirical difficulties listed in other parts of this study, policy makers, planners and administrators most often prefer to support their arguments for or against certain programs and projects with the "hard" facts of health services provided, i.e. the "inputs" into the health production process. Usually one finds this input-information displayed as average ratios, e.g. X thousand services of kind A per Y thousand recipients. Almost no attention, however, is given to the concentration of services within the group of recipients. A literature search for the application of concentration measures in the health services field produced

only a few efforts in that direction (Gurfield[1], Ginzberg and Rogatz[2]).

This portion of the study should develop the rationale for concentration measures of health services and then perform such an analysis using actual data.

1. Why Measures of Concentration or Distribution for Health Services Utilization?

a) Program and Project Evaluation

The nature of the health production process with its long investment periods and its great element of risk and uncertainty makes it hard for an administrator to evaluate his projects on grounds of outcomes or "outputs" of the system. For judgment based on outcomes he needs either a large population or a long time series of observations and preferably both.

On the project level he usually lacks both. He is left with observing his inputs (or intermediary outputs) and has to infer from their behavior on the success of his project. The more relevant and meaningful those "input-measures" the more appropriate will his decision be.

Most of the available evaluation studies stratify the research sample carefully according to sex-race-age characteristics and compare average utilization rates with outcomes. No systematic treatment of concentration of services is available in the literature.

This paper suggests that concentration measures are useful additions to the set of statistics presently used in

evaluating the contribution of various health services inputs into the health production process. The ultimate goal, of course, would be to relate differences in concentration measures to differences in health services outcomes. This, however, is a long term and elaborate undertaking and is outside the scope of this study.

b) Project Administration

Project evaluations are usually of a longer term nature. Yet, a review of reports on OEO and HEW health facilities indicates that many projects lack relevant information which could guide the local administrators in the short run. It is argued that also here concentration measures are an improvement over the reporting of plain averages. The administrator's problem is sometimes rooted in a phenomenon which the theoretical literature calls "moral hazard."[3]

c) Moral Hazard

The health services planning and evaluation literature is full with discussions of overuse, possible overuse and abuse of services in the absence of a direct payment mechanism. Studies which provide empirical evidence of moral hazard report mainly average figures but fail to pin down the characteristics of overusers and do not show how this overuse phenomenon is distributed throughout specific populations.

d) International Comparisons

Almost every study dealing with the United States "health crisis" contains a section contrasting American data

with those from Sweden or the United Kingdom, etc. With alarm it is then usually pointed out that in terms of mortality rates (infant and others) the U.S. ranks higher than other nations which conventionally are considered "less developed" or at least poorer. Most studies proceed then to contrast this face with the figures on per capita expenditures on health services. Since, with this ranking, the U.S. ranks on the top it is concluded that the U.S. health services system (or "nonsystem") is suffering from gross inefficiencies.

It should here not be argued that inefficiency does not exist but rather that part of the inefficiency is attributed to the wrong causes and is being researched and consequently attacked with misguided emphasis.

Besides suffering from different standards for data and collection systems international comparisons of expenditures are subject to the problem of purchasing power differentials. The difference in purchasing power is extremely crucial in highly labor intensive production such as the production of health in its present organization. The policy recommendations given to remedy this situation are correct: increase the productivity of the highly trained medical manpower by furnishing them with better organization, technology and assistance.

But, will this close the health status gap observed in international statistical comparisons? Probably it will not, unless the distributional impact of health services

utilization is taken into consideration.

A rather casually observed phenomenon impresses the student of international comparisons of health care. Countries with otherwise similar characteristics which rank high in quality of income distribution also rank high in terms of health status indices. Although this is not a universal rule, it points toward some relationship between income distribution and national health status indices. There are no studies known to the author which systematically investigate this phenomenon.

2. Concentration Measures

Several publications have appeared utilizing and developing concentration measures. Some deal with income distribution such as those by Bonnen[4], Bowman[5], Miller[6] and Morgan[7], some deal with problems of industry concentration as summarized by Grossack[8]. An exploration of various kinds of concentration measures is found in Alker and Russett[9], in Aigner and Heins[10], and in Theil[11]. Although there are several measures of concentration available, only two related measures are discussed in this study. They are Lorenz curves and Gini ratios.

a) Lorenz Curves

One obtains Lorenz Curves by plotting the cumulative percentage of recipients against the cumulative percentage of receipts (Figure A1). In the case of completely equal distribution, the resulting Lorenz Curve coincides with the diagonal. The less equal the distribution the further the

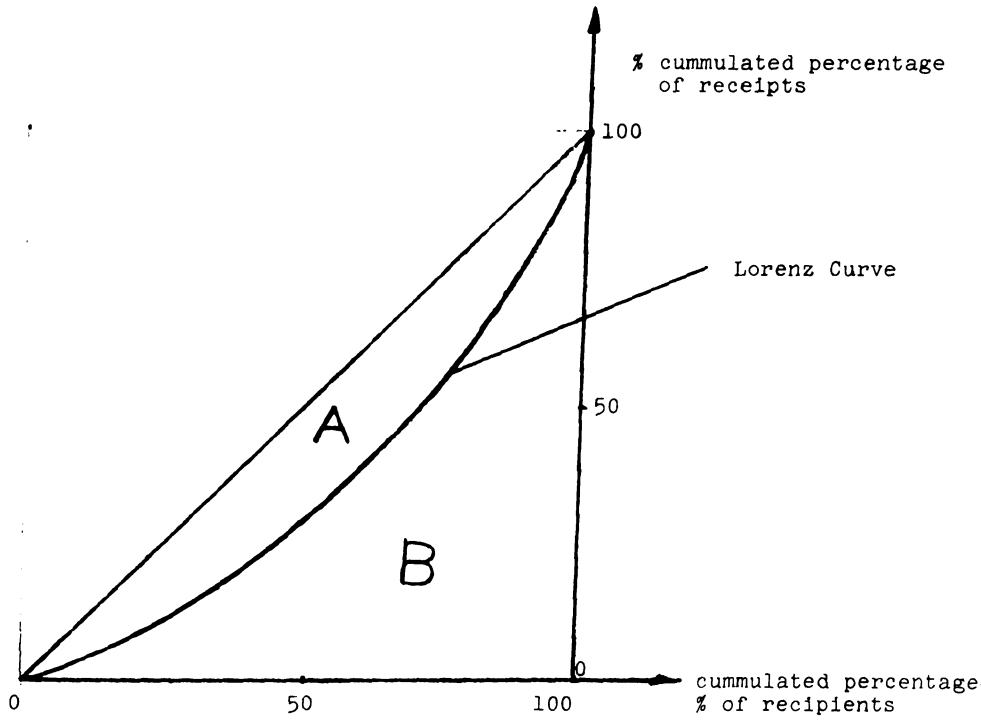

Figure A1. Lorenz Curve

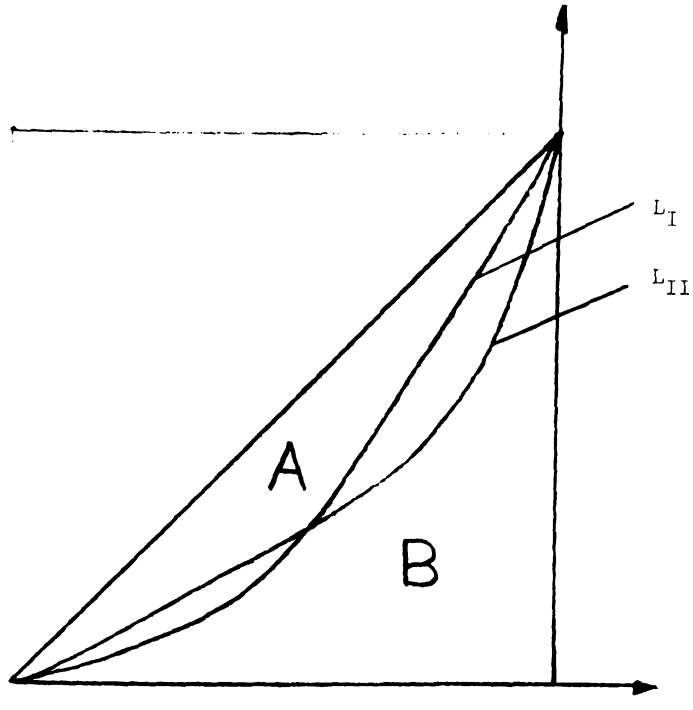

Figure A2. Crossing Lorenz Curves

Lorenz Curve moves away from the diagonal. In the extreme case where one recipient gets the total amount to be distributed the Lorenz Curve coincides with the coordinates.

b) Gini Ratios

To get a numerical measure of concentration, Gini suggested the ratio (G) of the area between the Lorenz Curve and the diagonal divided by the area between the coordinates and the diagonal, i.e. $G = \frac{A}{A+B}$. Completely equal distribution results in a Gini ratio of 0, complete concentration yields a coefficient of 1, thus defining the upper and lower bound of possible concentration ratios.

c) Crossing Lorenz Curves

In establishing Gini ratios one is sometimes confronted with the problem of crossing Lorenz curves (Figure A2). Both Lorenz curve (L_I) and (L_{II}) might include the same area (A), thus resulting in identical Gini ratios although obviously describing different situations. Thus far no satisfying method could be developed to ameliorate this problem. In fact, most researchers hope that the phenomenon will not occur and if it occurs assume that it does not impose a serious problem. This paper is no exception to this "rule."

3. Calculations of Gini Ratios

To introduce the reader to the procedure it might be helpful to present the steps which are undertaken in income distribution studies.

First, the range of income has to be divided in relevant and manageable strata and grouped at a decreasing or increasing order. The number of strata to be selected is of considerable significance since a small number of strata will result in large line segments and will thus result in a smaller value for area A, or in other words, will lead to an underestimation of the Gini coefficient. Several approaches to deal with this situation are available in the literature (Benson[12]).

For computational purposes the Gini coefficients are calculated in the following way.[13] Take the area of a square (A + B) x 2 to be equal to 1 and that of the triangle (A + B) to be equal to 1/2 (Figure A3). The Gini ratio can now be interpreted as $G = \frac{1/2 - B}{1/2} = 1 - 2\,(B)$. The area (B) is now calculated by assuming that the Lorenz Curve can be approximated by straight lines and by calculating the area of the resulting quadrangular segments. The area of each segment (i) is denoted by F_i,

where (1) $$F_i = (x_{i+1} - x_i)\left(\frac{Y_1 + Y_{i+1}}{2}\right)$$

Area B is the summation over all i, i.e.

(2) $$B = \Sigma\ (X_{i+1} - X_i)\left(\frac{Y_i + Y_{i+1}}{2}\right)$$

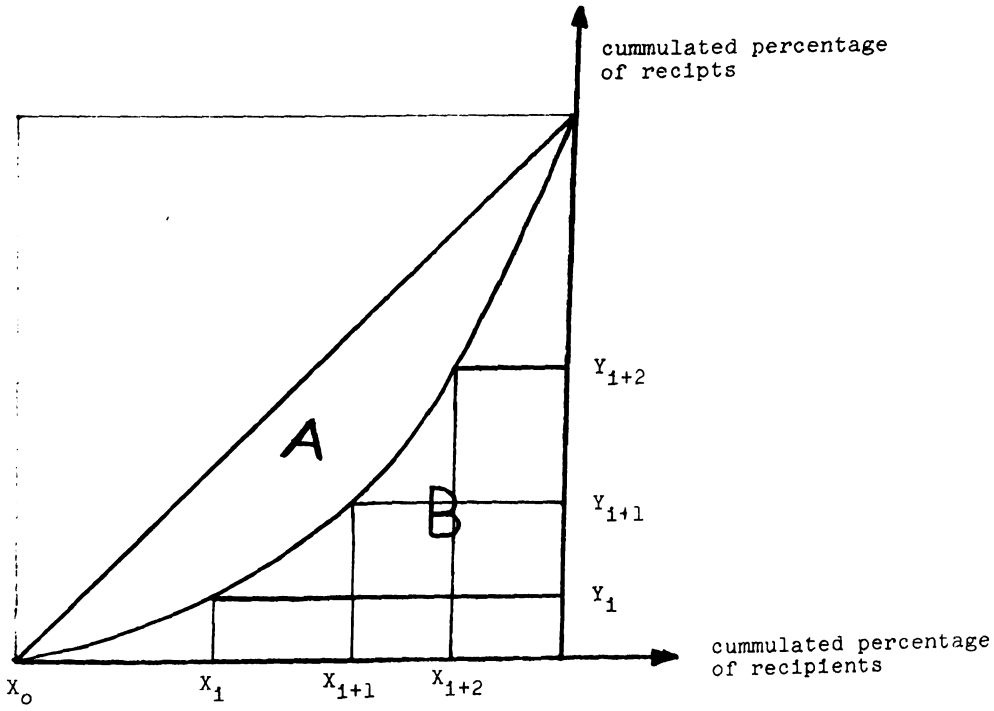

Figure A3. Computation of Gini Coefficient.

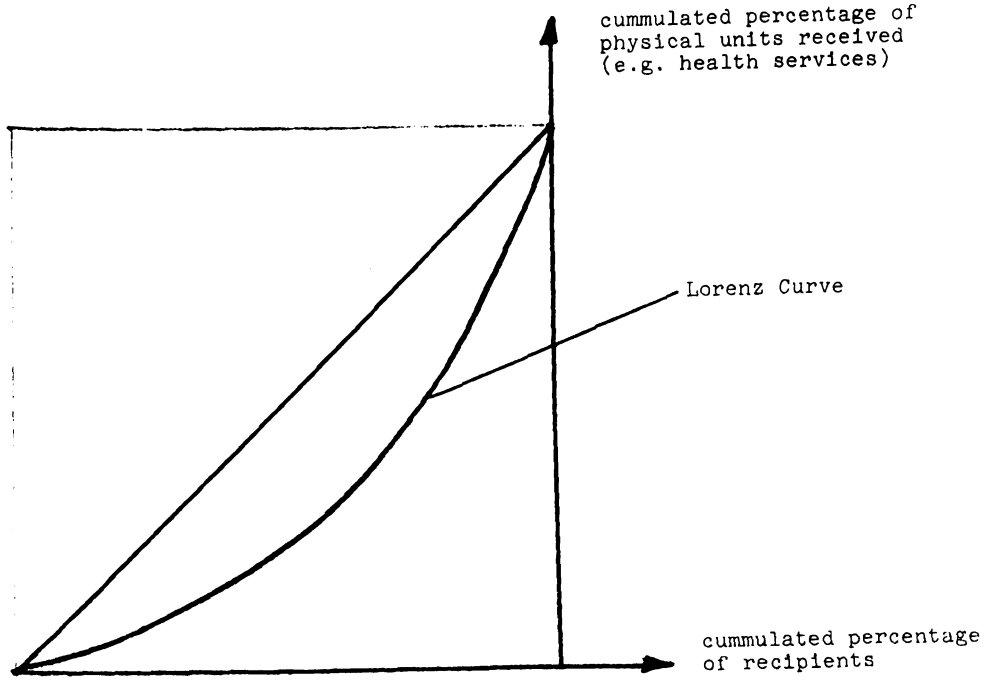

Figure A4. Concentration of Physical Units Received.

This leads to the following numerical expression of the Gini coefficient.

$$G = 1 - 2 \Sigma (X_{i+1} - X_i \left(\frac{Y_i + Y_{i+1}}{2} \right)$$

or

$$(3)\ G = 1 - \Sigma (X_{i+1} - X_i) \ (Y_i + Y_{i+1})$$

4. Concentration of Health Services Utilization

a) In the Presence of Market Prices

If the researcher knows the market prices for services consumed it is a rather simple process to extend the income distribution analysis to that of health services utilization. This procedure assumes that the costs of services reflect the amount and quality of the service rendered. It is also assumed that market prices are known to the investigator.

b) In the Absence of Market Prices

Much of present day research is concerned with the provision and evaluation of social infrastructure which is organized outside the constraints of the market mechanism with its guiding parameters--prices and costs. Health services are but one example of public "interference" with the market.

To apply Lorenz Curves to such a situation one has to rely mainly on the quantities of services provided. A "strong" assumption, however, has to be introduced, in pursuing this strategy: services rendered have to be similar in quality and should cost the provider similar amounts of

resources (time and other resources).

In the case of health services, only a sufficient large sample will warrant these assumptions. Since this particular study is concerned with the evaluation of health services delivery in a largely free-service setting, the following empirical investigation will apply the "non-market" approach by using data from the Western Michigan Comprehensive Health Services Project. Lorenz curves and Gini ratios will be established as depicted in Figure A4. This graph differs from the usual (income) distribution framework in that the physical units of the transferred commodities are recorded and not their monetary value.

5. Empirical Analysis

a) Hypotheses To Be Tested

Three main hypotheses were the starting point of this part of the study:

Hypothesis (1): There are differences in concentration rates of health services utilization for different user groups and different service categories.

Hypothesis (2): Differences in concentration rates are related to differences in health status and other socioeconomic outcomes of population groups.

Hypothesis (3): Concentration rates can be used for evaluation and planning purposes.

Only Hypothesis (1) can be tested at this stage of the research, although it is anticipated that the information necessary to examine the validity of the other two hypotheses can be developed at subsequent stages. (Especially a better understanding of outcomes is needed.)

b) Data Preparation

The services provided by the Health Center were grouped into 44 different services categories using partly the Center's categories and partly combining Center categories into blocks of services, in order to reduce the amount of services to a manageable size.

A computer routine was developed to extract a ten percent sample from the files of approximately 7,000 registrants. For each of the 699 sample registrants a separate printout was obtained listing their case number, sex, age, county of residence plus their utilization of the services categories.

The program was written in such a way as to display a person's receipt of the 44 services over the period of one quarter of a year. The services were then aggregated and appeared as totals on every data sheet. The same type of information was produced for three consecutive quarters.

c) Stratification of Population

To test Hypothesis (1) ("There are differences in concentration rates of health services utilization for different user groups and different services categories.") the population was categorized into different strata:

Female-Male. Available health statistics give clear evidence that there are significant sex-specific differences in health services utilization. This study should add to this existing knowledge information on concentration of utilization.

Black-White. Because racial differences are often associated with differences in health care availability it is advantageous to stratify the population along racial characteristics. There were only ten "Other" (mainly American Indian and Mexican Americans) out of the 699 sample registrants. Although this is still 1.4 percent of the population, it was decided to put them together with the group "Black."

Age Groups. The age groups of 0-4; 5-14; 15-44; 45-69; 65+ reflect important stages in a person's life in relation to the health services system. (School entry, onset of fertility and entry of labor force, menopause, retirement). These or very similar breakdowns are used in most health related studies.

Residency. Since distance is one of the crucial factors in health services planning it is of interest to examine variations in concentration rates in terms of patient-to-provider distance. Originally it was planned to account for the presence of satellite facilities by basing this analysis on township data. Unfortunately, the small sample size and inaccurate reporting of residency precluded this more refined analysis. This study compares,

therefore, only Lake County (where the main clinic is located) with the other three counties served by the project. The other three counties, Mason, Manistee, Newaygo are called "Satellite Counties."

d) Results

Equation (3) formed the basis for a computer program which calculated the concentration coefficients for the various groups of recipients and services. An attempt at developing concentration rates for the rather high amount (44) of services being investigated conflicted with the comparatively small sample size of 699 recipients. Only in a few cases curves could be obtained, in many cases only points or no estimates at all could be calculated.

Two ways were open to circumvent this statistical problem of "limited" degrees of freedom. One was to group the services into larger categories--compounding the problem of incompatibility (and non-additivity) of services, the second was to examine the data at a simple level of cross stratification. A combination of both alternatives was taken here. On one hand all 44 services were grouped into three basic classes: Medical, Dental, Family Services; on the other hand only a simple stratification of clients was employed.

The results of this analysis are displayed in Table A1. Each cell contains two numbers: the integer represents the average amount of services utilized during the given time period. The number in parentheses indicates the degree of

Appendix Table A1. Average Utilization of Health Services and Concentration Ratios of Utilization [a]

Group of Clients or Patients	Lake County				Satellite Counties			
	Medical Services	Dental Services	Family Services	Total	Medical Services	Dental Services	Family Services	Total
1) Black Male	4 (.49498)	3 (.44375)	9 (.53135)	11 (.57655)	5 (.37586)	4 (.15385)	9 (.57143)	8 (.40972)
2) White Male	3 (.41758)	4 (.33155)	8 (.66052)	9 (.56757)	4 (.44339)	5 (.41467)	8 (.67960)	8 (.55048)
3) Male	4 (.47236)	4 (.37944)	8 (.61920)	10 (.58989)	4 (.43570)	5 (.39221)	8 (.66266)	8 (.53897)
4) Black Female	4 (.50084)	3 (.35114)	10 (.50537)	13 (.50602)	8 (.51515)	4 (.32143)	30 (.51995)	26 (.62879)
5) White Female	5 (.47846)	4 (.38080)	14 (.67290)	14 (.63974)	4 (.46231)	5 (.37465)	4 (.51755)	7 (.48574)
6) Female	5 (.49380)	4 (.37464)	12 (.61955)	13 (.59205)	5 (.48320)	5 (.37837)	8 (.66711)	9 (.57242)
7) Black	4 (.50141)	3 (.39390)	9 (.52078)	12 (.53750)	6 (.49217)	4 (.26500)	19 (.60756)	17 (.62777)
8) White	5 (.47959)	4 (.36474)	12 (.68514)	12 (.63428)	4 (.45517)	5 (.39225)	6 (.61959)	7 (.51999)
9) 0-5	3 (.40842)	2 (.28571)	5 (.30303)	5 (.47231)	3 (.41012)	4 (.29894)	2 (.23438)	4 (.38889)
10) 6-16	2 (.28816)	4 (.33747)	4 (.41417)	5 (.45408)	2 (.28924)	6 (.36280)	4 (.42424)	7 (.40470)
11) 17-45	4 (.47620)	4 (.36449)	10 (.60188)	13 (.56488)	4 (.40572)	3 (.32378)	8 (.65268)	7 (.55004)
12) 46-65	6 (.50195)	4 (.34747)	10 (.55423)	15 (.54458)	6 (.39549)	7 (.44444)	8 (.63333)	11 (.56136)
13) 66+	5 (.42318)	4 (.47107)	15 (.66290)	18 (.61301)	8 (.46045)	4 (.26000)	13 (.68145)	17 (.60835)
14) Total Average	4 (.49272)	4 (.37890)	11 (.60873)	12 (.59894)	4 (.46266)	5 (.38758)	8 (.66726)	8 (.55790)

Note: a) Each cell contains two numbers: the integer represents the average amount of services utilized during the given time period. The number in parentheses indicates the degree of concentration of the utilized services, where 1.00000 would be completely concentrated and 0.00000 would be perfectly equally distributed.

concentration of the consumed service, where 1.000 would be completely concentrated and 0.000 would be perfectly equally distributed.

An inspection of Table A1 shows that the concentration of services varies widely between the various cells. For instance, black males in Lake County receive medical services with a concentration ratio of .49498. Their white counterparts receive medical services with a lesser concentration (.41758). Similarly, black males in Lake County receive dental services at a higher concentration (.44375) than white males (.33155).

The significance of these data can be emphasized by examining the average rates of the first four cells of the Lake County sample (medical and dental services for black and white males). Although both medical and dental services are consumed at higher concentration rates by the male black group, average rates of blacks are only larger for medical services while they are lower for dental services. Similar observations can be made for other cells of Table A1.

6. Conclusions

The analysis of the available data indicates that in the case of the Western Michigan Comprehensive Health Center services are differently distributed among the selected groups. Whether this is "normal" or not cannot be determined without relating concentration to measures of health status outcomes and physiological and mental states of users. The data in Table A1 prove that average utilization data do

not describe utilization completely and are insufficient indicators in evaluating the Western Michigan Comprehensive Health Center Project.

The main objective of this presentation was not to prove or disprove a particular hypothesis but to explore possible uses of concentration measures. This exploration was done in light of the fact that although both OEO and HEW have created programs and projects to improve the distribution of health services, no formal research has been proposed to explain the mathematical relationship between changes in the health services distribution and changes in the established health status indices of various populations. It seems, however, to be vital to understand the "mechanics" of an indicator which is being used not only as an argument for political discussions but also as an actual measuring stick for success or failure of national or local policies and programs. This section was intended to explore one type of concentration measure, i.e. Gini Ratios, in relation to health services utilization. Experimenting with other measures is recommended as an agenda for further research in this area.

FOOTNOTES

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2. E. Ginzberg and P. Rogatz, Planning for Better Hospital Care (New York: King's Crown, 1961).

3. Mark V. Pauly, Medical Care at Public Expense (New York: Praeger Publishers, 1971), p. 42.

4. James T. Bonnen, "The Distribution of Benefits from Selected U. S. Farm Programs," Rural Poverty in the United States, A Report by the President's National Advisory Commission on Rural Poverty (Washington, D. C., May, 1968), pp. 461-505.

5. Mary Jean Bowman, "A Graphical Analysis of Personal Income Distribution in the United States," American Economic Review, 35 (September, 1945), pp. 607-28.

6. Herman P. Miller, Trends in the Income of Families and Persons in the United States: 1947-1960, Bureau of the Census Tech. Paper 8 (Washington D.C.: Government Printing Office, 1963).

7. James Morgan, "The Anatomy of Income Distribution," Review of Economics and Statistics, 44 (August, 1962), pp. 270-283.

8. I. M. Grossack, "Toward an Integration of Static and Dynamic Measures of Industry Concentration," Review of Economics and Statistics, (August, 1965), pp. 301-308.

9. Hayward R. Alker and Bruce M. Russett, "On Measuring Inequality," Behavioral Science, Vol. 9, No. 3 (July 1964), pp. 207-18.

10. D. J. Aigner and A. J. Heins, "A Social Welfare View of the Measurement of Income Equality," Review of Income and Wealth, 13 (March, 1967), pp. 12-25.

11. Henri Theil, "The Measurement of Income Inequality," Economics and Information Theory, Chapter 4 (Amsterdam: North Holland Publishing Co., 1967).

12. Richard A. Benson, "Gini Ratios: Some Considerations Affecting Their Interpretation," American Journal of Agricultural Economics, Vol. 52, No. 3 (August, 1970) pp. 444-47.

13. Bonnen, op. cit., p. 462.

APPENDIX B

Appendix Table 31. A Profile of the Four Counties Served by the Health Project and the Corresponding State Averages.[a]

	Lake	Newaygo	Mason	Manistee		State
Age:						
All ages	5,661	27,992	22,612	20,094		8,777,560
65 and over	1,168	3,250	2,968	2,718		638,184
Sex:						
Male	2,778	13,685	11,157	9,829		3,882,868
Female	2,883	14,307	11,455	10,265		3,940,326
Race:						
White	4,365	27,298	22,383	19,853		7,085,865
Nonwhite	1,296	694	229	241		737,329
Urban places (with 2,500 or more population)		3,465	9,021	7,723		5,739,132
Population per household	2.94	3.41	3.23	3.22		3.42
Median school years completed	8.7	9.5	10.3	9.8		10.8
General economy:						
Median income of families in dollars	$3,158	$4,583	$4,991	$5,112		$6,256
Median value of housing units	$5,400	7,800	$9,200	7,600		12,000
Percent of families with $3,000 or less	48.0	29.3	25.2	21.1		15.7
Percent of families with 10,000 or more	3.1	8.1	7.6	7.3		17.4
Per capita personal income	$2,370	$2,369	$2,606	2,956		2,324
Public Assistance Payments(monthly average)						
Old age assistance	182 @$65	197 @$60	183 @$84	122 @ $76		$75.51
Aid to dependent children	89 @ 165	263 @186	162 @ 178	123 @ 153		201.15
Aid to blind	6 @ 66	4 @ 98	2 @ 15	1 @ 123		100.83
Aid to the disabled	67 @ 98	89 @ 89	88 @ 93	59 @ 74		101.43
General assistance	18 @ 69	42 @ 67	15 @ 133	42 @ 57		118.07
Employed persons by major industry group:						
Total employed	1,490	7,370	7,347	6,443		2,726,864
Agriculture, forestry and fisheries	172	1,129	749	442		93,662
Mining	12	28	0	16		15,340
Construction	176	390	388	430		125,562
Manufacturing	277	2,620	2,162	2,386		1,035,892
Utilities	75	388	865	449		155,588
Trade	254	1,189	1,406	1,134		484,018
Finance and real estate	21	155	189	162		89,556
Business repair and personal services	248	486	462	394		195,226
Other services	136	682	722	747		347,601
Public administration	72	185	218	195		94,837
Industry not reported	47	118	186	88		89,582
Inventory of health and medical resources						
a. Manpower: M.D. *	2	13	18	13		8,759
D.O. **	1	1	1	4		1,904
Dentists	5	9	13	13		4,572
b. Hospitals and long-term facilities						
Licensed hospitals	0	2	1	2		249
Licensed nursing homes	0	2	2	0		410
Homes for aged	0	0	0	0		130
County med. care fac.	0	1	1	1		41
Livebirth rate per 1,000 population	16.0	17.3	14.1	16.0		19.0
Infant death rates per 1000 livebirths:						
under 1 year	39.0	15.1	16.1	15.9		21.6
under 1 day	0	8.6	0	6.4		10.4
under 7 days	26.0	13.0	6.4	9.6		15.2
under 28 days	26.0	13.0	9.6	9.6		16.5
Perinatal death rate per 1000 total births	38.5	17.2	22.2	12.7		27.8
Illegitimate ratio per 1000 livebirths	142.9	58.3	64.3	60.5		98.5
Persons divorced per 1000 population	6.3	4.7	6.2	3.2		5.9
Crude death rate per 1000 population	21.5	10.4	12.0	13.0		8.9

* Source: Michigan State Board of Reg. in Medicine
** Source: "Education for Health Care in Michigan" 1970

a) Adapted from: Michigan Department of Public Health, Descriptive Summary of Western Michigan Comprehensive Health Services Project, Inc., Baldwin, Michigan (Lansing, Michigan: MDPH, 1970). (Mimeographed.)

Appendix Table B2. Demographic and Economic Profile: Lake County a)

POPULATION AND AREA

	1970	1960	Number Change	Percent Change
Total Population	5,661	5,338	323	6.1
Percent of State	.06	.07		
County Density/square mile	9.9	9.3		
Land Area in square miles	571			
Net Migration 1960 to 1970 (b)		416		

AGE DISTRIBUTION - 1970

	Male	Female	Percent of Total Male	Percent of Total Female
Under 18	912	914	32.8	31.7
18-44	650	673	23.4	23.3
45-65	621	723	22.4	25.1
65 and over	595	573	21.4	19.9
Total	2,778	2,883	100.0	100.0

INCOME

	1969	1959	Percent Change
Total Personal Income (thousands of dollars)	$11,900	$5,600	112.5
Percent of State	.03	.03	0.0
Per Capita Income County (b)	$ 2,120	$1,049	102.1

INCOME BY MAJOR SOURCES (thousands of dollars)

	1967
Total Personal Income	$8,900
Total Wage & Salary Disbursements + Other Labor Income	3,800
Proprietors' Income	1,800
Property Income	1,200
Transfer Payments Less Personal Contributibutions for Social Insurance	2,000
Total Earnings	5,600
Farm Earnings	- 64
Total Non-Farm Earnings	5,706
Government Earnings	1,904
Total Federal	467
State and Local	1,437
Private Non-Farm Earnings	3,802
Manufacturing	656
Mining	4
Contract Construction	417
Trans. Comm. & Public Utilities	247
Wholesale & Retail Trade	1,138
Finance, Insurance & Real Estate	190
Services	1,077
Other	73

a) Adapted from: Michigan Department of Commerce, Economic Profile, (Michigan Department of Commerce, Office of Economic Expansion, Research Division, November 1971). (Mimeographed).

Appendix Table B3. Demographic and Economic Profile: Montmorency County [a]

POPULATION AND AREA

	1970	1960	Number Change	Percent Change
Total Population	5,247	4,424	823	18.6
Percent of State	.06	.06		
County Density/square mile	9.5	8.0		
Land Area in square miles	555			
New Migration 1960 to 1970 (b)		685		

AGE DISTRIBUTION - 1970

	Male	Female	Percent of Total Male	Percent of Total Female
Under 18	925	864	35.4	32.8
18-44	623	658	23.8	25.0
45-65	623	725	23.8	27.5
65 & over	444	385	17.0	14.7
TOTAL	2,615	2,632	100.0	100.0

INCOME

	1969	1959	Percent Change
Total Personal Income (thousands of dollars)	$11,900	$5,400	120.4
Percent of State	.03	.03	0.0
Per Capita Income County (b)	2,294	1,234	85.9

INCOME BY MAJOR SOURCES
(thousands of dollars)

	1967
Total Personal Income	
Total Wage and Salary Disbursements	9,300
+ Other Labor Income	4,800
Proprietors' Income	1,800
Property Income	1,100
Transfer Payments Less Personal Contributions for Social Insurance	1,600
Total Earnings	6,600
Farm Earnings	- 11
Total Non-Farm Earnings	6,630
Government Earnings	1,791
Total Federal	282
State and Local	1,509
Private Non-Farm Earnings	4,839
Manufacturing	1,411
Mining	-
Contract Construction	440
Trans. Comm. & Public Utilities	108
Wholesale & Retail Trade	1,676
Finance, Insurance, and Real Estate	231
Services	894
Other	79

a) Adapted from: Michigan Department of Commerce, Economic Profile (Michigan Department of Commerce, Office Of Economic Expansion, Research Division, November 1971). (Mimeographed).

Appendix Table B4. Summary of Budget of the Western Michigan Comprehensive Health Services Project for Years B - E *

	B	C	D	E
Personnel Costs	948,957	1,577,335	2,708,950	2,384,384
Salaries and wages	78,207	168,135	1,849,000	1,707,291
Fringe Benefits	16,650	288,300	277,350	256,093
Consultants and Contract Services			592,600	421,000
Non-personnel costs	685,864	503,630	687,455	
Travel	76,700	110,000	110,000	113,086
Space Costs and Rentals	124,197	61,480	92,200	
Consumable Supplies	28,183	208,000	294,500	334,200
Equipment	456,784	60,650	87,755	75,778
Other Costs	380,432	63,500	103,000	247,520
Total Costs	2,015,253	2,080,965	3,396,405	3,154,968

* Year B - January 1, 1969 - December 31, 1969

Year C - November 1, 1969 - October 31, 1970

Year D - November 1, 1970 - October 31, 1971

Year E - November 1, 1971 - October 31, 1972

Source:

Bettie L. Nelson, Profile of Lake County and the Five-Cap Area (Lansing: Michigan Department of Public Health, 1972), p. 59.) (Mimeographed).

Appendix Table B5. Comparison of Socio-Economic Indicators Between Lake County and Montmorency County

Indicator	Lake	Montmorency
Poverty Index [b]	129.5	115.1
Poverty rank among 83 Michigan Counties	83	81
Percent functional illiterate	13.7	4.4
Median school years	8.6	9.8
Average annual unemployment rate:		
1965	7.6	6.1
1966	9.7	5.9
1967	9.8	10.6
1968	13.6	8.8
Population/Physician Ratio 1968 (including M.D.'s and Osteopaths)	1125	4200

a) Adapted from: W. E. Vredevoogd, Rural Poverty in Michigan, Report No. 21, Rural Manpower Center, Michigan State University, November 1970 (East Lansing: Rural Manpower Center, 1970), pp. 15-65.

b) Prepared from 1960 census data. The index consists of the sum of four percentages, % earning $3000 or less, % unemployed, % functionally illiterate, % houses in bad repair. Highest possible score is 4 x 100% = 400.

Appendix Table B6. Eligibility Criteria for OEO - [a], Foodstamps - [b], and Commodity [c] Programs.

Number in Household	OEO Annual Income Nonfarm	OEO Annual Income Farm	Foodstamps [d] Monthly Income	Commodity [e]
1	2.000	1.700	210	210
2	2.600	2.100	250	250
3	3.300	2.800	307	290
4	4.000	3.400	373	330
5	4.700	4.000	440	370
6	5.300	4.500	507	410
7	5.900	5.000	573	450

a) Source: Health Center Records, Baldwin, Michigan

b) Source: Social Services Dept. Records, Baldwin, Michigan

c) Source: Social Services Dept. Records, Atlanta, Michigan

d) The maximum allowable resources of all members of a household may not exceed $1500. Exception: For households of two or more persons with a member or members age 60 or over, the allowable maximum is $3000.

e) The maximum allowable liquid assets may not exceed $1000 for one-member households and $1500 for households with 2 or more members.

Appendix Table B7. Profile of Sample Households. Comparison between Lake County and Montmorency County (Values of the Montmorency County sample are in brackets, while percentages are in parentheses) a)

Section

1) Number of sample households according to their race and their public assistance status

	BLACKS (Lake Only)	WHITES (Lake Only)	TOTAL SAMPLE
Not on assistance (NA)	20 (24% of Sum total)	39 (46% of Sum total)	59 (70% of Sum total) [49 (58%)]
On public assistance(PA)	17 (20% of Sum total)	8 (10% of Sum total)	25 (30% of Sum total) [35 (42%)]
Total	37 (44% of Sum total)	47 (56% of Sum total)	Sum total = 84 [84]

Section

2) Average number of household members (Household questionnaire #a)

	BLACKS (Lake Only)	WHITES (Lake only)	Total Sample
Not on assistance (NA)	2.77	3.2	3.0 [2.9]
On public assistance(PA)	3.26	3.6	3.4 [3.5]
Total	3.01	3.4	3.2 [3.2]

Section

3) Length of residency of sample households (Household questionnaire #c)

	BLACKS (Lake Only)	WHITES (Lake only)	Total Sample
Lived 5 yrs. & in county	29 (78% of all blacks)	36 (77% of all whites)	65 (77% of total sample)
Lived 1-4 yrs. in county	8 (22% of all blacks)	11 (22% of all whites)	19 (23% of total sample)

	NA Clients	PA Clients	Total Sample
Lived 5 yrs.& in county	49 (83% of all NA) [44(90%)]	16(64% of all NA) [24 (69%)]	65 (77% of total sample [68(80%)]
Lived 1-4 yrs. in county	10 (17% of all PA) [5(10%)]	9(36% of all PA) [11 (31%)]	19 (23% of total sample [16(20%)]

Section

4) Availability of sanitary facilities (Household questionnaire #i-e)

	BLACKS (Lake Only)	WHITES (Lake Only)	Total (Lake Only)
Complete facilities 1968, 1971/72	27 (73% of all blacks)	28 (60% of all whites)	55 (66% of total sample)
Improved facilities since 1968	8 (22% of all blacks)	5 (10% of all whites)	13 (15% of total sample)
Lack facilities completely 1968-72	2 (5% of all blacks)	14 (30% of all whites)	16 (19% of total sample)

	NA Clients	PA Clients	Total Sample
Complete facilities 1968, 1971/72	43 (73% of all NA) [33 (67%)]	12 (48% of all PA) [25 (72%)]	55 (66% of total sample) [58 (69%)]
Improved facilities since 1968	7 (12% of all NA) [10 (21%)]	6 (24% of all PA) [6 (17%)]	13 (15% of total sample) [16 (19%)]
Lack facilities completed 1968-72	9 (15% of all NA) [6 (12%)]	7 (28% of all PA) [4 (11%)]	16 (19% of total sample) [10 (12%)]

Section

5) Change in heading of homes of sample households as perceived by the respondents (Household questionnaire #m)

	BLACKS (Lake Only)	WHITES (Lake Only)	TOTAL (Lake Only)
Heading improved since 1968	13 (35% of all blacks)	11 (23% of all whites)	24 (29% of total sample)
Heading stayed the same since 1968	23 (62% of all blacks)	32 (68% of all whites)	55 (65% of total sample)
Heading worsened since 1968	1 (3% of all blacks)	4 (9% of all whites)	5 (6% of total sample)

	NA Clients	PA Clients	Total Sample
Heading improved since 1968	17 (29% of all NA) [20 (41%)]	7 (28% of all PA) [15 (43%)]	24 (29% of total sample) [34 (42%)]
Heading stayed the same since 1968	38 (64% of all NA) [26 (53%)]	17 (68% of all PA) [19 (54%)]	55 (65% of total sample) [45 (53%)]
Heading worsened since 1968	4 (7% of all NA) [3 (6%)]	1 (4% of all PA) [1 (3%)]	5 (6% of total sample) [4 (5%)]

Section Appendix Table 7 (con't)

6) Change in nutrition of sample households as perceived by the respondents (Household questionnaire #p)

	BLACKS (Lake Only)	WHITES (Lake Only)	Total (Lake Only)
Family nutrition improved since 1968	18 (49% of all blacks)	24 (51% of all whites)	42 (50% of total sample)
Family nutrition did not improve since 1968	19 (51% of all blacks)	23 (49% of all whites)	42 (50% of total sample)

	NA Clients	PA Clients	Total Sample
Family nutrition improved since 1968	29 (49% of all NA) [14 (29%)]	13 (52% of all PA) [13 (37%)]	42 (50% of total sample) [27 (32%)]
Family nutrition did not improve since 1968	30 (51% of all NA) [35 (71%)]	12 (48% of all PA) [22 (63%)]	42 (50% of total sample) [57 (68%)]

Section

7) Respondents who indicated that they and their families would visit the doctor more often if they had more income or if doctor services were more readily available. (Household questionnaire #g)

	BLACKS (Lake Only)	WHITES (Lake Only)	Total (Lake Only)
Would see doctor more often	21 (57% of all blacks)	24 (51% of all whites)	45 (54% of total sample)
Would not see the doctor more often	16 (43% of all blacks)	23 (49% of all whites)	39 (46% of total sample)

	NA Clients	PA Clients	Total Sample
Would see doctor more often	31 (53% of all NA) [22 (45%)]	14 (56% of all PA) [15 (43%)]	45 (54% of total sample) [37 (44%)]
Would not see doctor more often	28 (47% of all NA) [27 (55%)]	11 (44% of all PA) [20 (57%)]	39 (46% of total sample) [47 (56%)]

Section

8) Enrollment of sample households in comprehensive health center (obtained from HC records, Lake County Only)

	BLACKS (Lake Only)	WHITES (Lake Only)	Total (Lake Only)
Enrolled	34 (92% of all blacks)	29 (62% of all whites)	63 (75% of total sample)
Not enrolled	3 (8% of all blacks)	18 (38% of all whites)	21 (25% of total sample)

	NA Clients (Lake Only)	PA Clients (Lake Only)	Total (Lake Only)
Enrolled	46 (78% of all NA)	17 (68% of all PA)	63 (75% of Total sample)
Not enrolled	13 (22% of all NA)	8 (32% of all PA)	21 (25% of total sample)

Section

9) Change in real income of sample households as perceived by the respondents (Household questionnaire #v)

	BLACKS (Lake Only)	WHITES (Lake Only)	Total (Lake Only)
Real income has improved since 1968	16 (43% of all blacks)	17 (36 of all whites)	33 (39% of total sample)
Real income has stayed the same since 1968	8 (22% of all blacks)	10 (21 of all whites)	18 (22% of total sample)
Real income has worsened since 1968	13 (35% of all blacks)	20 (43 of all whites)	33 (39% of total sample

	NA Clients	PA Clients	Total Sample
Real income has improved since 1968	21 (36% of all NA) [11 (22%)]	12 (48% of all PA) [9 (26%)]	33 (39% of Total sample) [20 (24%)]
Real income has stayed the same since 1968	13 (22% of all NA) [22 (45%)]	5 (20% of all PA) [12 (34%)]	18 (22% of total sample) [34 (40%)]
Real income has worsened since 1968	25 (42% of all NA) [16 (33%)]	8 (32% of all PA) [14 (40%)]	33 (38% of total sample) [30 (36%)]

Section

10. Average of highest grade level of school completed by head of sample households (Household questionnaire #w)

	BLACKS (Lake Only)	WHITES (Lake Only)	Total Sample
NA	7.9	9.0	9.4 [8.5]
PA	10.5	10.0	10.3 [9.6]
Total	9.2	9.5	9.9 [9.1]

Note: [a] Black and white comparisons are for Lake County sample only since there are no black families in the Montmorency county sample.

Appendix Table C1: Codes of Household Characteristics of Individuals (As Listed on Computer Tape of Member Questionnaires)

Column Location on Computer Tape				
Column 45	White:1		Black:2	
Column 46			Residency in County 5 yrs+	Residency in County 1-4 yrs
	Lake County	Not on Publ. Ass. (NA)	1	2
		On Publ. Ass. (PA)	3	4
	Montmorency County	Not on Publ. Ass. (NA)	5	6
		On Publ. Ass. (PA)	7	8

Column 47	All Sanitary Facilities in 1968 and in 1971/72	Partial Sanitary Facilities in 1968 and in 1971/72	No Sanitary Facilities in 1968 and in 1971/72
Heating up since 1968	1	3	5
Heating same or down	2	4	6

Column 48-49		Income Up	Income Same	Income Down
Family Nutrition Up Since 1968	Would See Doctor More Often	11	12	13
	Would See Doctor Not More Often	21	22	23
Family Nutrition Not Up	Would See Doctor More Often	31	32	33
	Would See Doctor Not More Often	41	42	43

Column 50-51 Education of Head of Household (Grades Completed)

Column 52-53 Enrollment in Health Center (Lake County population only): If "Not Enrolled":1 If "Enrolled" or in Montmorency County: blank.

APPENDIX C

H O U S E H O L D

Column location on computer tape of Household questionnaire

1-3	
4-5	#

a) Before we start, I'd like to find out something about who lives in your household. Let us start with the head of the household:

For each household member, complete first line on "MEMBER" questionnaire.

1) Fill in # of household member.
2) First name.
3) Relationship: "head," "spouse," "children."
4) Age, sex.

b) Is there anyone else who usually lives with you?

c) How long have you and the members of your household been in this county?

- [1] Longer than 5 years → (d)
- [2] Longer than 1 year → "MEMBER" questionnaire
- [ ] Shorter than 1 year → "EXIT" interview

6	

d) List those members of your household who moved into this county during the last 5 years.

	Relation to head of household	From where did _____ come	When
1)			
2)			
3)			

e) GO TO "MEMBER" questionnaire. Finish "HOUSEHOLD" questions at the end of the interview.

7	#

f) List those of your family who are presently in a hospital, home for the aged or extended care facility:

NAME	Age	Sex	Relation to head of household	What facility is _____ in?	Since when has _____ been there?
1)					
2)					
3)					

8

g) List those members of your household who have died since 1968:

NAME	Age	Sex	Relation to head of household	When died	Did _____ live with you during the last year of his life?
1)					☐ YES ☐ NO
2)					☐ YES ☐ NO
3)					☐ YES ☐ NO

9

h) The next questions are related to housing.

i) Did you have a working bath tub or shower during the last year? [1] YES [2] NO — 10

j) Did you have a working bath tub or shower in 1968? [1] YES [2] NO — 11

k) Did you have a working flush toilet during the last year? [1] YES [2] NO — 12

l) Did you have a working flush toilet in 1968? [1] YES [2] NO — 13

m) If you compare last year with 1968, did your heating [1] improve since 1968? [2] stay the same? [3] worsen? — 14

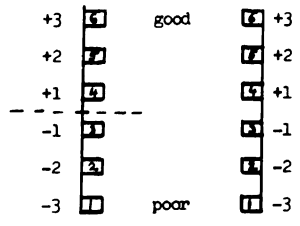
n) Now I would like to ask you a few questions related to nutrition and health services.

o) If you compare this year with 1968, do you as an individual now eat
[1] more meat [2] same [3] less — 15
[1] more milk [2] same [3] less — 16
[1] more vegetables [2] same [3] less — 17

p) Has your family's nutrition improved since 1968? [1] YES [2] NO — 18

q) Would members of your household visit the doctor more frequently if you had more income or if doctor services were more readily available? [1] YES [2] NO — 19

r) During the last year, how would you rate the availability and quality of health care in this area? Choose a position on the scale.



6 5 4 3 2 1 — 20 (71) — 21 (5.8) — 22 + 23 (Δ)

s) Where would you place availability and quality of health care in 1968? better than now? worse than now? How many levels up or down would you place it in 1968?

t) If there was a change between 1968 and 1971/72, what caused it? LIST

u) With the next question we would like to find out how your income situation has changed since 1968.

v) Do you think that since 1968 your household's income situation has
[1] improved? [2] stayed the same? [3] worsened? — 24

w) What was the highest level of education completed by the head of the household? LIST: ☐ — 25 + 26

OBTAIN FROM RECORDS:

x) [1] Black Not on Assistance [2] White Not on Assistance [3] Black On Public Assistance [4] White On Public Assistance — 27

y) [1] Not Enrolled in Health Center [blank] Enrolled in Health Center — 28

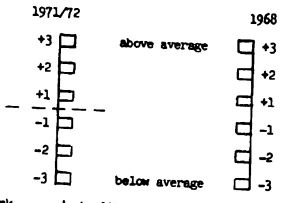
MEMBER

Column location on computer tape of member questionnaire

1-3	
4	
5	Rel
6-7	Age
8	M=1 F=2

First Name: _____ Relationship to head of household: _____ Age: _____ Sex: _____

1) If you compare _____'s health with that of other people of his/her age and sex, how would you rank _____ on the following scale for the past 12 months?



9	71
10	68
11-12	Δ

2) How would you rank _____'s health for 1968? Better than now? Worse than now?
How many levels up or down would you place _____ for 1968?

3) If there was a change between 1968 and 1971/72, what caused it? LIST:

4) Did _____ have a general physical exam or a medical checkup since 1968? [1] YES [2] NO

5) Did _____ have a dental checkup during the past 12 months? [1] YES [2] NO

6) How many times did _____ go to a dentist during the past 12 months? [ ] times

7) How many times did _____ go to a doctor or health worker during the past 12 months? [ ] times

8) Is _____'s activity limited in any way because of disability or health? [1] YES [2] NO → (13)

9) What can _____ not do because of disability or health? LIST:

10) What are the health conditions that caused this limitation? LIST:

	MONTHS	YEARS

11) About how long has _____ been that way? How many months? How many years?

12) Does _____ need help from another person getting around inside or outside the house? [1] YES [ ] NO

13	
14	
15-16	
17-18	
19	

→ 13) AGE: 0-17 years → (34) 18 and over → (14)

14) In terms of health, is _____ able to work at all around the house? [ ] YES [2] NO

15) Is _____ limited in the kind of home activities because of health? [3] YES [ ] NO

16) Is _____ limited in the hours spent on home activities because of health? [4] YES [5] NO

20	

17) On how many days of the past 365 days did illness or injury keep _____ from the things he/she usually does around the house? [ ] days

21-23	

18) Age 66+ → (EXIT); otherwise go to (19).

→ 19) Do health conditions keep _____ from being employed or self-employed? [2] (6) YES [ ] NO

20) Is _____ limited as to occupation or kind of work because of health? [3] (7) YES [ ] NO

21) Is _____ limited in the amount of work he/she can do because of health? [4] (8) YES [5] (9) NO

24	

22) Was _____ employed at all during the last year? [ ] YES ○ NO → (EXIT)

23) On how many days of the past 365 days did illness or injury keep _____ from the things he/she usually does at home and on the job? [ ] days

25-27	
28	

24) Is _____ self-employed? [1] YES [2] NO → (26)

25) The next questions are about your employment. Please, think of the word "employed" to include the total of outside employment plus self-employment.

→ 26) Let us go over the past year, month for month, and find out how many weeks per month _____ worked during the last year.

27) How many weeks was _____ employed (plus self-employed) during the month of:	28) How many days per week was _____ employed (plus self-employed) during that time?	29) How many hours per day was employed (plus self-employed) during that time?	30) Why was _____ not employed (or self-employed) full-time during that period? (paid vacation = employed)	31) List for each month the number of days when illness or injury kept from the usual days employed.
Sept. 1971				
Oct.				
Nov.				
Dec.				
Jan. 1972				
Feb.				
March				
April				
May				
June				
July				
August				
			ADD:	

29-31	
32-34	

32) Speaking in general terms, how would you describe _____'s employment and self-employment during the past year? [1] FULL-TIME [2] 3/4 TIME [3] 1/2 TIME [4] 1/4 TIME [5] NO JOB

35	

33) Did _____ have more employment and self-employment in 1971/72 than in 1968 or less? [1] MORE than in 1968 [2] LESS than in 1968

36	

→ 34) Is _____ able to take part at all in ordinary play with other children? [ ] YES [2] NO

35) Is he limited in the kind of play because of his health? [3] YES [ ] NO

36) Is he limited in the amount of play because of his health? [4] YES [5] NO

37	

37) IF AGE 6-17 → OTHERWISE GO TO → (42)

38) In terms of health, would _____ be able to go to school? [ ] YES [2] NO

39) Does _____ have to go to a certain type of school because of health? [3] YES [ ] NO

40) Is _____ limited in school attendance because of health? [4] YES [5] NO

38	

41) If _____ goes to school, on how many days of the past school year did illness or injury keep _____ from going to school? [ ] days

39-41	

→ 42) On how many days of the past 365 days did illness or injury keep _____ from playing as usual and from going to school? [ ] days

42	
43	
44	