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a behavioral model of families' use of health services

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FOREWORD

It is not often that a researcher has the privilege and the opportunity of seeing his past work expanded and deepened by a younger colleague who chose to collaborate with him. Ronald Andersen, a graduate student in sociology from Purdue University, was engaged by the National Opinion Research Center and the Center for Health Administration Studies to be the project director of the nationwide household survey in 1963 on the use of and expenditures for health services in this country. I had been associated with two previous and similar surveys with NORC in 1953 and 1958. The third survey has been published:

Ronald Andersen and Odin W. Anderson, *A Decade of Health Services: Social Survey Trends in Use and Expenditures*. Chicago, University of Chicago Press, 1967.

This one was designed, conducted, and analyzed to be comparable to the previous two studies in order to show trends of use and expenditures in relation to the straightforward variables of age, sex, family income, residence, and the absence or presence of insurance. Variations in use, however, are based on deeper explanations than inferred in these studies. Ronald Andersen, therefore, devised a model of use of health services drawn from the data in the nationwide survey for this monograph of predisposing, enabling, and need components. This model goes beyond the simple one-to-one variables in the previous studies and hence I regard it as an expansion and deepening of studies on use with which I have been associated. This model should be of interest to sociologists and others working in the medical care field who have an interest in patterns of use.

The monograph is also an example of how graduate students can be engaged in an ongoing research project whereby they can develop an acceptable Ph.D. dissertation as well as a report of a more general nature. There are risks in this, however, both for the agency which is committed to a predictable payoff as represented in the book that was published and for

the student who must satisfy a dissertation committee. In this instance Ronald Andersen succeeded handsomely in accomplishing both objectives.

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I wish to express my gratitude to those individuals who provided essential help during various phases in the preparation of the report: Diane Andersen aided in the organization and preparation of the data; Frank Bamberger and Albert Steiner, of the University of Chicago Computation Center, installed the AID computer program used in the statistical analysis; Joanna Kravits edited and proofread the manuscript; Barbara Nausieda typed the many copies; and William Richardson provided constructive comments on earlier versions of the report.

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CHAPTER I

INTRODUCTION

This is a study of families' use of health services. The fundamental problem considered is why families differ in the amount of medical care they consume.[1] The thesis proposed is that utilization can be understood by a model composed of predisposing, enabling, and need components. Further, the import of these components will be different for hospital, physician, and dental care. This latter expectation is related to the varying amounts of discretion exercised by the family in procuring each type of care.

The data for this study are drawn from a nationwide social survey of 2,367 families conducted in early 1964. This survey was the latest in a series of three conducted at five-year intervals by the Health Information Foundation (HIF) and the National Opinion Research Center (NORC) of the University of Chicago.[2] Each survey collected information through personal interviews about family health experiences for a period of one year prior to the interview. The interviews stressed types and amounts of health services used, costs of these services, and how families paid for them.

All of the HIF-NORC surveys have shown that families differ considerably in their use of and expenditures for health services. In 1963, for example, the eight per cent of all families with the highest expenditures in the country accounted for 36 per cent of total family spending for health. In contrast to these, the 30 per cent of all families with the lowest expenditures spent only three per cent of the total.[3] The present study seeks to expand previous analyses of these differences.[4]

[1] The findings of this study were originally presented in more detailed form in the author's Ph.D. dissertation. Andersen (1968).

[2] The final report for the most recent study was published as Andersen and Anderson (1967). A detailed methodology including sampling procedure and the questionnaire is found in that book and also in the dissertation. The earlier studies were reported in Anderson and Feldman (1956), and Anderson *et al.* (1963). HIF is now a unit of the Center for Health Administration Studies of the University of Chicago.

[3] Andersen and Anderson (1967, p. 57).

[4] Such differences have been related to family characteristics including size, income, health insurance coverage, and education of head. Anderson and Feldman (1956, pp. 25–29, 41–44); Anderson *et al.* (1963, pp. 16–19, 91–92); Andersen and Anderson (1967, pp. 53–56).

HEALTH SERVICE USE

A large and growing sector of the American population seeks hospital, physician, and dental services each year. In 1930 the Committee on the Costs of Medical Care (CCMC) found that less than one-half of the people saw a doctor.[5] Today, two-thirds of the population see a physician at least once every year.[6] The average number of visits per person increased from 2.6 per year to 4.5 per year during this time span.[7] The CCMC study showed that 5.8 per cent of the population were admitted to a general hospital annually.[8] And the rate of use was 59 hospital days per 100 persons each year.[9] Currently, about nine per cent of the people in the United States enter a general hospital at least once each year and the rate of use has reached 134 days per 100 people per year.[10] The proportion of people using dental services each year has doubled from 21 per cent to 42 per cent during this 35-year period.[11]

This growing demand for health services has been accompanied by the development of a large, complex health service system. From 1900 to 1960 the professional health personnel-population ratio increased from 2.6 per 1000 persons to 6.4 per 1000 persons. The health service industry now employs some three million persons in hospitals, clinics, health organizations, private offices, laboratories, and other places where health services are provided.[12] It is predicted that by 1975 the health industry will become the nation's largest employer.[13]

From one perspective, then, a massive health service system is being created by the population's demand for services. From another, the system can be viewed as having a significant impact on the lives of individuals and families. Services provided by the system reach the majority of the people in one form or another each year.

Symbolic of their pervasive nature is the trend in obstetrical care. As

[5] Falk *et al.* (1933, p. 101). These findings were based on a social survey of 8,758 families living in 17 states. The families were interviewed six times by a public health nurse over a period of twelve consecutive months within the period of February, 1928, to May, 1931. The study excluded non-white families.

[6] National Center for Health Statistics (NCHS) (1965, Series 10, No. 19, p. 1).

[7] Falk *et al.* (1933, p. 283); and NCHS (1965, Series 10, No. 18, p 1).

[8] Falk *et al.* (1933, p. 101).

[9] *Ibid.* (p. 283).

[10] NCHS (1965, Series 10, No. 20, p. 2); and NCHS (1966, Series 10, No. 30, p. 1).

[11] Falk *et al.* (1933, p. 101); and NCHS (1966, Series 10, No. 29, p. 1).

[12] U.S. Public Health Service (1964, *Health Manpower Source Book*, Section 18, pp. 1–3).

[13] National Advisory Commission on Health Manpower (1967, p. 1).

late as 1940 only about one-half of all births occurred in hospitals.[14] By 1964 this proportion had increased to 97 per cent.[15] The facilities of the system are quite rapidly replacing the home as a place to die as well as a place to be born. Between 1935 and the present time the percentage of all deaths occurring in the hospital increased from one-third to over one-half.[16]

Studies of our expanding utilization of health services can have both theoretical and practical relevance.

> From the standpoint of sociology, statistics on utilization of health services can be used as indexes of certain kinds of population behavior: they reveal how much health services are expected to cost under certain circumstances; from the standpoint of medical care, they may show to what extent a population is receiving medical care. In other words, utilization of health services reveals varying patterns of significance to a wide range of interests.[17]

Theoretically, use of health services can be viewed simply as another form of human behavior. Consequently, the sociologist can study utilization using the same theory and methods he might employ to study voting behavior or work role behavior. It might be argued that health and illness behavior are unique among the various types of social behavior because of the importance of the seemingly "non-social" variables of biology and disease. However, Zola points out that, "It is not merely that there are social and psychological factors in illness but that illness is a social and psychological phenomenon. It cannot be understood or have any meaning without reference to a social context."[18] An important purpose of this study is to place the utilization of health services within such a social context.

The practical relevance of utilization studies stems, in large part, from their contribution to our understanding of the problems of distributing health services. The social significance of these problems grows with increasing societal support for the idea that access to medical care is a right of all men regardless of their personal resources.[19] Yet, in actuality, con-

[14] NCHS (1964, Series 21, No. 1, p. 26).

[15] NCHS (1967, Series 21, No. 11, pp 24–25).

[16] Lerner and Anderson (1963, p. 249).

[17] Anderson (1963, p. 349).

[18] Zola (1964, p. 17).

[19] As early as 1952 the President's Commission on the Health Needs of the Nation stated: "It is now abundantly clear that the provision of adequate health services profoundly affects the individual's chances of survival and the strength and happiness of the Nation as well. This fact imposes certain ethical and practical considerations upon us. When the very life of a man, or the lives of his family, may depend upon his receiving adequate medical services, society must make every effort to provide them. When this man knows that such health boons exist, available to some and denied to him, a free society will find the way to comply with the demand that he will surely make. These benefits sometimes can be obtained by the individual's own effort; but when these efforts fail, other means must be found. *And democracy requires that the same high quality of service be made available to all men equally*" (1951, p. 1).

siderable differences remain among various segments of the population with respect to the type and quantity of health services they use.[20]

The problems of distribution are magnified by rising expenditures for medical care. These increasing expenditures represent a significant shift in the allocation of resources in this country. Since World War II expenditures for health have risen from less than four per cent to over six per cent of the gross national product.[21] In absolute amount, expenditures are approaching 50 billion dollars a year.[22]

Part of this increase has occurred because people are using more services. However, much of the increase in expenditures can be attributed to rising prices for medical care. From 1946 to 1966 medical care prices increased 110 per cent compared to 66 per cent for consumer prices in general.[23] With the advent of Medicare the rate of increase of medical care prices has accelerated. For example, in 1966 consumer prices as a whole rose 3.3 per cent while physician fees increased by 7.8 per cent and hospital daily service charges rose 16.5 per cent.[24]

Increases in medical care prices arouse considerable concern among the general public, medical care specialists, and the Government:

> The consumer is adversely affected when higher prices put medical care out of the reach of many of those who need it most. Rising prices also increase the cost of Government medical programs and thus place a heavier burden on the tax payer. The medical care specialist, involved in providing services in an institutional or non-institutional setting, is concerned because the growing demand for medical services must be met and rising costs tend to impede the delivery of such services.[25]

While this study is not directly concerned with price increases, it does deal with the related and more fundamental problem of distribution. By studying the relationship of family characteristics to the amount of health services consumed, some insight may be achieved into ways to distribute services more equally.

[20] President Johnson, in a recent message to Congress, stated, "To be poor is to be without adequate medical care: (1) One-half of all women who have their babies in public hospitals have received no prenatal care at all. (2) More than 60 per cent of poor children with disabling handicaps are not receiving any medical care. (3) Sixty per cent of all poor children never see a dentist. (4) The chance of a child dying before the age of one is 50 per cent higher for the poor. (5) The chance of dying before reaching the age of 35 is four times greater for the poor. (6) The poor man, making $2,000 a year or less—in many cases because of previous illness—will lose twice as many working days from illness as the man who makes $7,000 or more" (*Congressional Record*, 1967).

[21] Merriam (1966, p. 16).

[22] National Advisory Commission on Health Manpower (1967, p. 1).

[23] Rice and Horowitz (1967, p. 16).

[24] *Ibid.*, p. 18.

[25] *Ibid.*, p. 13.

The family is the unit of analysis chosen for this study.[26] It has generally been considered an appropriate unit for studying consumption patterns of most consumer goods and services because it is the primary earning, spending, and consuming unit in our society. The family seems particularly appropriate for analyses of health service utilization because of changing needs for medical care through the family life cycle and because the family as a unit often decides what medical care a family member will receive.[27] Life-cycle stage and family decision making and their relationships to health service use are discussed below.

The Family Life Cycle

Life cycle has been defined as "an idealized construct representing the important stages in the life of an ordinary family."[28] The classifications are determined by combining several more elementary variables which change as the modal family progresses through its life span. Katona, for example, includes nine family classifications in his life-cycle variable defined according to age, marital status, and occupational status of the head of the family and presence and age of children in the family.[29] These classifications generally describe typical family development. Early stages include pre-marriage through marriage and the birth and growth of children. Later stages are when the children leave home and the head of the family retires. The final stage of the family is when one of the original marital pair has died, leaving a single widow or widower.

In addition to descriptive studies of change in family structure,[30] the

[26] A family is defined for this study as one person or a group of persons living together and related to each other by blood, marriage, or adoption. However, when two related married couples are found living in a single dwelling unit, each married couple and its unmarried children are a separate family. Any person unrelated to anyone else in the dwelling unit is a separate family.

[27] For general references and literature reviews regarding the relationships between the family, health, and health service use, see Griffiths (1954); Byrd (1956, pp. 250–254); Vincent (1963); Mabry (1964); Haggerty (1965).

[28] Lansing and Morgan (1955, p. 36). Kenkel points out that families do not have a life cycle in the same sense that the individual does. "Family life cycle is a rather metaphorical expression that suggests a likeness to the life cycle of the individual organism. However, it is a useful concept because there are typical stages through which the family goes, even though deviation from them is no evidence of pathology. It is a sociological frame of reference that allows us to identify a changing set of family-life attributes that have a demonstrable effect on individual behavior and interaction within the family" (1960, pp. 323–326).

[29] Katona *et al.* (1963, p. 105). Alternative classifications are suggested by Blood (1955, p. 52); Fisher (1955, pp. 28–35); Lansing and Morgan (1955, pp. 36–40); and Duvall (1958, pp. 334–343).

[30] Glick (1947, pp. 164–174); Glick (1957, pp. 53–70); Glick and Park (1965, pp. 187–202); Loomis (1936, pp. 180–199); Loomis and Beegle (1950, pp. 77–87); Duvall (1962); Hammel (1961, pp. 989–1005).

concept has proved to be an important tool in explaining variations in social and economic behavior of the family.[31] It has been used to study mental disorders in old age, why families move, and leisure activity.[32] Life-cycle stage has played an important part in the explanation of consumer behavior and family income and savings patterns.[33]

Family life cycle has a relationship to families' use of health services which is in some respects more basic than its relationship to other types of family behavior. Among the essential tasks of families are reproduction and the physical maintenance of their members.[34] Accomplishing both of these tasks in modern American society usually results in the use of considerable quantities of health services. Since the needs of the family members change through the life cycle, the nature of the tasks also changes. Consequently, volume and type of health services used vary from stage to stage.[35]

Thus, "pre-child" families, characterized by small size and young, healthy adult members, use relatively few services. Families in the reproductive stage are most likely to consume large quantities of hospital and physician care. This volume results in part from the almost universal use of medical care and hospitalization for childbirth. Families with growing children tend to use relatively large amounts of most types of services. Compared to other types of families, their use of dental services is particularly high. As the children leave home and the size of the family shrinks, the total amount of medical care consumed decreases. However, the parents are beginning to age, and with onset of chronic disease the services used per family member increase quite rapidly. In the last stages of the life cycle families are likely to utilize considerable quantities of most types of services except dental care. Drugs and medicines account for a particularly large share of all services used in these stages because of their use in treating diseases associated with old age.[36]

[31] Lansing and Kish explore the use of the life-cycle concept as an explanatory variable (1957, pp. 512–519).

[32] Belknap and Friedsam (1949, pp. 367–376); Rossi (1955); Cunningham and Johannis (1960, pp. 25–32).

[33] Clark (ed.) (1955); Lydall (1955, pp. 131–150); Modigliani and Ando (1960); David (1961).

[34] Duvall (1962, pp. 48–49).

[35] Despite these important relationships, relatively few studies have been done in this area. Volume and type of health services used by families according to life-cycle stage have been explored by Katona *et al.* (1963, pp. 95–105); and Andersen and Anderson (1965).

[36] Some of the trends described in this paragraph are based on unpublished tables constructed by Andersen and Anderson (1965) in the course of their life-cycle analysis.

The Family as a Decision-making Unit

The family as a unit often determines whether or not a family member is to receive medical care, and, if care is deemed necessary, whether it should be provided by the family or the formal health services system. The family makes decisions at every stage of a member's illness from diagnosis through treatment and recuperation.[37]

The decision to seek a physician is often jointly made. It may come about only after discussion within the family of bumps, swellings, or "feeling bad."[38] Thus, defining a condition as illness, as something necessitating treatment, in large part depends on the patient's family. These family diagnoses are, of course, particularly important for children.[39] But they often play an important role in lay diagnoses of adults as well.[40]

If a physician is consulted and treatment is short term, family interaction may be of little further importance. However, a patient's compliance with a longer term medical regimen varies considerably, and family judgments appear to be a major source of this variation.[41] In addition, the family's ability to obtain and sustain professional care for members varies with such factors as family income and health insurance coverage.[42]

The family is particularly influential during the patient's recuperation-rehabilitation period when nursing care is needed. The capacity of a family to care for its disabled members is influenced by its composition, living arrangements, and socioemotional climate.[43] These factors in part deter-

[37] For a review of family decision making as it relates to general consumer behavior patterns, see Foote (ed.) (1961).

[38] Mabry (1964, p. 161).

[39] Blood and Wolfe (1960, p. 121).

[40] Friedson (1960, p. 263).

[41] Elling *et al.* (1960, p. 183); and Davis and Eichhorn (1963, pp. 246–249).

[42] Laughton (1958); NCHS (1963, Series 10, No. 2, pp. 13–21); and Andersen and Riedel (1967, pp. 21–28).

[43] There are contrasting views of the family role in performing sick-care functions for the patient. Parsons and Fox suggest that the stability and harmony of the family are endangered by the presence in the home of old, sick, retarded, or handicapped family members (1952). The social organization of the modern, urban nuclear family makes it increasingly necessary as well as convenient for the family to surrender its traditional sick-care functions to the hospital.

Conversely, Vincent argues, "the notion that the sick-care functions are incompatible with the organization if not the goals and interests of the modern family is contradictory to a number of current developments and trends" (1963, pp. 112–113). These trends include specialization in medicine and the demise of the family doctor with his intimate knowledge of family members, increased awareness of the potentially detrimental results of the patient's long-term separation from home and community life, and increased use of family and community treatment settings.

Thus, while Parsons is concerned with the needs of the family, Vincent concentrates on the needs of the patient. If the underlying assumptions of both are correct, it appears that a basic dilemma may be present, with the modern family becoming increasingly unable to provide the support indicated by current trends in medical care.

mine whether nursing functions are undertaken by the family or delegated to others.[44]

In addition, the health care needs of one family member may influence the health services received by others. Thus, simultaneous illness of more than one member may force the family to use outside sources of care which they would not have needed for a single ill person. Conversely, illness and the resulting care of one member may result in delay of medical care of another member or a shift from professional to family sources of care. Delay, or a shift to family care, is likely when the family is unable to meet the financial demands of multiple illness.

CHAPTERS TO FOLLOW

In Chapter II a three-stage model of family health service use is developed. This model assumes that for use to take place: (1) a family must be *predisposed* to receive medical care; (2) there are *enabling* conditions that allow the family to attain health services; and (3) the family must perceive a *need* for these services. These components of the model are defined and related to the literature of health and illness behavior. In addition, hospital, physician, and dental services are contrasted with respect to the amount of *discretion* exercised by the family in using each. Chapter II concludes with a statement of hypotheses which are derived from the model.

Chapter III discusses the dependent variables for the study: measures of health service use. The method of construction starts with services used, such as hospital days and physician visits, and converts them to "dollar equivalents" or units of use. This allows use of different types of services to be compared or added together to arrive at a summary measure of medical services used by the family.

Chapter IV examines the hypotheses concerning predisposing, enabling, and need components as they relate to the total volume of services families consume. Chapter V considers the hypotheses about family use of hospital, physician, and dental services. These services were selected for separate analyses because they are major components of the total. In addition, the assumption is made that predisposing, enabling, and need components will have differential importance in explaining each type of use because the

[44] For instance, data from the National Health Survey show that hospital utilization among persons living alone or with non-relatives was high for both sexes and all age groups. This situation. . . . . "may have been due to their being in a less favorable position for receiving proper care at home when they were ill." NCHS (1962, Series B, No. 37, p 7).

discretion, or choice, the family typically exercises in using these services varies. Discretion is assumed to be lowest for hospital services, intermediate for physician services, and highest for dental services.

The final chapter suggests implications of the findings. These concern modifications of the model, methods to reduce the unexplained differences in use, and social policies for distributing health services.

CHAPTER II

A BEHAVIORAL MODEL OF HEALTH SERVICE USE

An underlying assumption of this study is that use of health services is the result of a complex, interrelated set of factors. To go beyond simple description of use patterns—to begin to understand how and why individuals and families use health services—requires the development of a theoretical foundation.

The purpose of this work is to contribute to the sort of research approach that Anderson found largely absent from studies of utilization but necessary for further development in the field:

> It is reasonable to assume that patterns of utilization are not quixotic; in different contexts there are patterns of utilization dependent on such factors as illness levels, age and sex composition of the population, presence or absence of health facilities, family income, residence, and the perceptions of providers and recipients of health services. All of these are important, but some have more bearing on utilization than others. Further, their relative importance—except for age and sex—varies with circumstances.
>
> So far, statistics on utilization by various kinds of biological and social variables are straightforward and simple. There is an abundance of data relating use of various types of health services to factors such as family income, residence, ethnic group, and so on. These are necessary as a base for formulating hypotheses and planning more complex research into the interrelationships of social factors and use of health services.[1]

PREVIOUS BEHAVIORAL MODELS OF HEALTH SERVICE UTILIZATION

Concurrent with, and following Anderson's review of the literature, a number of works began to appear using general behavioral models for viewing people's use of and expenditures for health services.[2] Among the

[1] Anderson (1963, pp. 349–350). The need for development of such theoretical frameworks in the field of medical sociology has also been stressed by other writers. See comments by Friedson and Cassel in Polgar (1962) and Suchman (1963, pp. 11–12).

[2] "Model" as used in this study refers to a logical specification of anticipated interrelationships between certain characteristics of an individual, family, or geographical area and utilization of health services. This use of the term "model" corresponds generally with its usage by Simon (1957, pp. 10–13) and Blalock (1964, pp. 1–26). The adjectives "general behavioral" suggest models which attempt to incorporate economic and social as well as biological variables into an overall scheme to explain health service use.

earliest of these was Weeks' study of 500 middle income families in Hackensack, New Jersey. He attempted to show why families spent what they did for medical care. He concluded that social and cultural factors were more important to health care than income per se, although the former might be associated with income.[3]

Subsequent approaches used to explain utilization and expenditures can be roughly divided according to their emphasis on economic or social-psychological factors. The economic models stress means through which people can attain services or translate their perceived need into economic demand for medical care. Thus, these models stress such variables as family income, health insurance coverage, and the prices of health services. In contrast, the social-psychological models are more likely to concentrate on variables which explain differential perceptions of the need for health services. They emphasize factors referred to by the economists as "tastes and preferences."[4]

Within the realm of the economists' tastes and preferences, the social-psychologist is likely to make additional distinctions. First he is interested in distinguishing disease as it might be clinically defined from social definitions of illness. Moreover, within the realm of the social variables the social-psychologist sees further need to differentiate the sociodemographic classifications such as education and class from social-psychological measures including perception of illness and values and attitudes toward health and illness. Such differentiation is viewed as one path toward understanding why people of different social classes have different patterns of utilization.

The following sections will briefly review economic and social-psychological models of health service utilization. They are included to show the sources of some of the ideas incorporated in the model which will be used in this study.

Economic Models

1. Feldstein developed an economic model to analyze community utilization and expenditure patterns found in the 1958 HIF-NORC study. He hypothesized:

> Expenditures on medical care are related both to a series of socio-demographic factors reflecting different utilization patterns and probabilities of illness and to a set of economic variables reflecting the ability of persons, given certain socio-demographic characteristics, to purchase medical care.[5]

[3] Weeks (1961, p. 78).

[4] While tastes and preferences are generally included in the economic models, their role tends to be less well defined than that of the economic variables.

[5] Feldstein, P. (1964, p. 57).

Conclusions of this study based on multiple regression analyses were:

In the studies of hospital care, dental care, and insurance expenditures, the explanatory variables in the multivariate analyses were able to account for a fairly high proportion (almost two-thirds) of the variations in the dependent variable. For total medical care expenditures and physician services the explanatory power of the approach was fair, accounting for only approximately one-third of the variations. . . . the statistical significance of certain explanatory variables differed according to the components of medical care analyzed.[6]

2. Rosenthal constructed a model for estimating the demand for general hospital facilities among the states. This model provided a framework for estimating utilization for an area from a combination of socio-demographic and economic characteristics.[7] The results of regression analyses of utilization data provided by the American Hospital Association for 1950 and 1960 suggested that consumers were exercising more choice in the latter period due to rising levels of living as well as greater availability of both services and methods of obtaining these services than had been true in 1950.[8]

3. Wirick studied the utilization patterns of a 3000 person sample representing the Michigan population in 1958. Demand for medical care was looked upon as demand for separate components including hospital, doctor, dentist, drugs, and other rather than for a single homogeneous product. Fundamental factors considered to have an effect on the demand for health services included: a) physiological need; b) realization of need; c) financial resources to implement care; d) motivation to obtain care; and e) availability of the service. Using a one-way analysis of variance technique specifically designed for multivariate analysis of social survey data, Wirick found that variance in different components of medical care was often explained by the same predictor but that the importance of predictors still varied considerably from component to component.[9]

4. Theodore provided a summary view of the economic approaches by outlining the successive stages in the formulation of demand for health services as:

a) existence of physiological or psychological conditions;
b) perception of the existence of such conditions;
c) willingness to manage or control such conditions through health care services;
d) ability to transform need into demand for health care.

[6] *Ibid.*, p. 72.

[7] Rosenthal (1964, p. 20).

[8] *Ibid.*, p. 43.

[9] Wirick (1966). This work is the most recent in a series of demand analyses based on the Michigan Survey. See also Wirick *et al.* (1962); and Wirick and Barlow (1964).

Variables classified as "consumer tastes" including incidence of disease, intensity of medical needs, level of education, and attitudes toward early care were expected to influence consumer actions during the first three stages of the development of demand for health care. Consumers in the fourth stage were assumed to be directed by "economic" factors such as income, health insurance coverage, prices of health services, and availability of free care.[10]

Social-Psychological Models[11]

1. Rosenstock, on the basis of his previous research and a review of the literature, hypothesized that a decision to obtain a preventive or detection test in the absence of symptoms would not be made unless the following conditions are satisfied:

a) the individual is psychologically ready to take action relative to a particular health condition;
b) the individual believes that the preventive test in question is both feasible and appropriate for him to use;
c) a cue or stimulus occurs to trigger the response.[12]

2. Stoeckle, Zola, and Davidson considered three factors particularly important to the patient's decision to seek medical aid in response to symptoms:

a) his objective clinical disorder and symptoms as well as his perception, knowledge, beliefs and attitudes about having a particular disorder or symptom;
b) his attitudes and expectations of the doctor and medical services;
c) his definitions of "health," "sickness," and when medical care is necessary.[13]

3. Suchman, using health survey data from a sample of 5340 persons in the Washington Heights community of New York City in 1960, presented a framework for analyzing the relationship between social factors and medical care. This framework showed a "causal" sequence which links "demographic factors to social group structure and both of these to health status and medical care by means of an intervening set of medical orientation factors generally indicative of a 'scientific' or 'popular' approach to health and medical care."[14] He concluded that demographic factors and

[10] Theodore (1966, pp. 91–92).

[11] The three models reviewed here concern, sequentially: (1) preventive health behavior; (2) seeking care in response to symptoms; and (3) the nature of medical care received.

[12] Rosenstock (1966, p. 119).

[13] Stoeckle *et al.* (1963, p. 976).

[14] Acknowledging the theoretical and methodological limitations of such a causal model, Suchman felt such an approach was justified because, "the field of medical sociology is badly in need of attempts to build conceptual frameworks based upon empirical data." (1965 [2], p. 13).

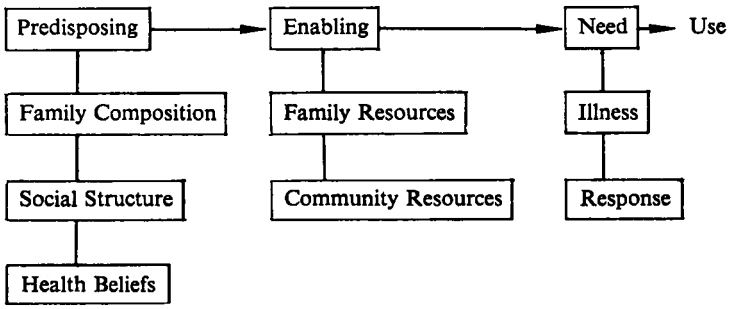
social group structure contributed independently to medical orientation. Further, demographic factors as well as medical orientation independently influenced the source of medical care chosen.[15]

THE MODEL FOR THIS STUDY

The approach used here will incorporate elements of the behavior models of health service use previously cited. These include: 1) Weeks' emphasis on the family as the unit of analysis;[16] 2) separation of the economic from social factors; 3) analysis of different types of health services;[17] 4) inclusion of perceptions of health and illness; and 5) specification of causal paths leading to health service use. It is hoped that the attempted synthesis of some of these ideas in the model explained below will add another dimension to our understanding of health service utilization.

The explanation of families' use of health services is based on a three-stage model consisting of predisposing, enabling, and need components. The model suggests that a sequence of conditions contribute to the volume of health services used. Use is dependent on: 1) the predisposition of the family to use services; 2) their ability to secure services; and 3) their need for such services. Further, the importance of each component depends on the discretion exercised by families in using services.

Each component of the model includes subcomponents. The model, including these subcomponents, can be diagrammed as follows:



[15] This approach is further developed in Suchman (1966, pp. 97–105).

[16] While analyses of geographical areas exemplified by the studies of Rosenthal and Feldstein seem best suited to determine community needs, and investigations of individuals are necessary to accurately determine the effects of certain variables like age and sex, the family was chosen as the unit of analysis for this study because of the influence of the family on the individual's health and illness behavior and the important interactions of family members reflected in family utilization rates. However, the model could be adapted to an analysis using either individuals or geographical areas as units of analysis.

[17] The value of studying alternative services was also stressed by Andersen and Anderson (1965, p. 20).

The nature of these components and subcomponents will be elaborated in following sections. The variables selected to measure these components in the subsequent empirical analysis are also listed.[18]

Predisposing Component

Some families have a propensity to use more health services than other families. This propensity toward use can be predicted by family characteristics which exist prior to the onset of specific episodes of illness. Families with these characteristics are more likely to use health services even though the characteristics are not directly responsible for health service use. Such family characteristics are defined as predisposing conditions. They include the subcomponents "family composition," "health beliefs," and "social structure" which are discussed below.

Family Composition. Age, sex, and family size are intimately related to health and illness. However, they are still considered to be predisposing conditions. Age, for instance, is not in itself a reason for seeking health care. Rather, people in different age groups have different types and amounts of illness, and, consequently, different patterns of medical care. The specific variables of family composition chosen for the empirical analysis include the age (19),[19] sex (17), and marital status (18) of the head of the family; as well as family size (15), age of the youngest family member (23), and age of the oldest family member (21).

Social Structure. This subcomponent reflects the location of a family in society as measured by characteristics of the family's main earner such as employment (26), social class (28), and occupation (30), and other variables including education of the head of the family (32), race (36), and ethnicity (35). These conditions suggest what the life style of the family may be.[20] They point to the physical as well as the social environment of the family and associated behavior patterns which may be reflected in the family's use of health services. Employment, education, and social class may appear more akin to enabling than to predisposing conditions. They are correlated with enabling conditions such as income and health insurance coverage. However, according to the model used in this analysis, these social char-

[18] Particular variables were selected in accordance with their degree of correspondence to various theoretical facets of the model for which measurement was necessary. The decisions were also based on a review of the literature concerning factors influencing utilization. A discussion of the findings of this review is found in Appendix B. Of course, selection of variables for this study was limited to data available from the 1964 HIP-NORC survey. However, one purpose of that study was to provide information relevant to a model such as the one used here.

[19] The number in parentheses following this and subsequent variables refers to an identification number in Appendix B where definitions of each independent variable and its marginal distributions are found.

[20] Ireland (ed.) (1966).

acteristics largely "precede" the enabling characteristics in time and are less subject to change. Social structure is assumed to influence enabling conditions as well as subsequent use patterns.

Health Beliefs. Beliefs about medical care, physicians, and disease constitute a third subcomponent of predisposing conditions. What a family thinks about health may ultimately influence health and illness behavior. Like family composition, health beliefs are not considered to be a direct reason for using services but do result in differences in inclination toward use of health services. For example, families who strongly believe in the efficacy of the treatment of their doctors might seek a physician sooner and use more services than families with less faith in the results of treatment.

Seven scales and indexes were constructed to measure family health beliefs. The response of the head of the family was used to represent the beliefs of all family members.[21] The scales and indexes are: value of health services (38), value of physicians (40), value of good health (41), value of health insurance (43), attitude toward health services (45), attitude toward physician use (47), and knowledge of disease (49).

Enabling Component

Even though families may be predisposed to use health services, some means must be available for them to do so. A condition which permits a family to act upon a value or satisfy a need regarding health service use is defined as enabling.[22] Enabling conditions make health service resources available to the family. Availability includes family means to attain services and geographic accessibility to services, both of which must be present, in some form, for services to be used. Enabling conditions are here measured by family resources and health service resources of the community in which the family lives.

Family Resources. The family's ability to obtain services for its members is assessed largely by the extent of their economic resources and their source of medical care. Measures of these resources include family income (51), family savings (52), health insurance (54), regular source of care (55), and welfare care (56).

Community Resources. Apart from family attributes, certain characteristics of the community in which the family lives can also enable the use of services. One such characteristic is availability of services. If sources of care are conveniently located for the family and can be used without

[21] When no response from the head was available, the response of his wife was substituted. Responses of the wife were used in 168 families.

[22] Katona defines enabling conditions as resources which change needs into demand (1960, p. 24).

"queuing up," they might be used more frequently. Also, families living in a community where the health education level is generally high and scientific medicine, as opposed to folk medicine, is stressed would be expected to use more services than families living in communities where the opposite is true.[23] The community resource variables are physician-population ratio (57), hospital bed-population ratio (58), residence (59), and region (60).

Need Component

Assuming the presence of predisposing and enabling conditions, the family must perceive illness or its possibility among its members for use of health services to take place. Need represents the most immediate cause of health service use.[24] Need is measured by the amount of illness perceived by the family and by the way the family responds to the perceptions.

Illness. All of the measures of illness used in this study are family self-reports of physical conditions which are considered less than optimal. These measures are a different phenomenon than that measured by a clinical examination, but there is still considerable correlation between the two.[25] Thus the measures represent primarily what people think and, in part, a disease which could be clinically verified.[26] The measures include health level (65), symptoms (62), disability days (63), and free care for major illnesses (66). The first three refer to different ways in which the family can report illness. The last is a combined measure of illness and means for attaining care.

Response. A perceived illness or adjudged poor health does not necessarily lead to use of health services. Certain predisposing and enabling conditions may inhibit use. Some families will not respond to symptoms of illness or disability by seeking medical care as readily as will others. Consequently, need is defined not only in terms of perception of illness but also by how the family reacts to illness or potential illness. Response is examined by two variables: seeing doctor for symptoms (67) and regular physical examinations (69).

Use and Discretion

The final component of the model is the resultant behavior, utilization of health services. Utilization can be characterized as including two types

[23] Friedson (1960).

[24] For discussions of the concept of need as applied to health service use and methods for measuring it, see Hoffer (1948, pp. 719–724), Schuler *et al.* (1949, pp. 205–212), Wirick *et al.* (1962, pp. 232–239), Boulding (1966).

[25] The meanings of responses to health questionnaires are discussed by Croog (1961), Scotch (1963–64), Abramson (1966).

[26] For a summary of problems regarding the measurements of health and illness see NCHS (1966, Series 2, No. 17).

of family behavior: discretionary and non-discretionary. Behavior which is highly discretionary involves considerable choice on the part of the family. Non-discretionary behavior is primarily dictated by the physical condition of the family member. Decisions in the latter instance are usually made by providers of services.

The concept of discretion is related to the other components of the model. It is assumed that the more discretionary the behavior, the more important will be the predisposing and enabling components in explaining this behavior. Such behavior is more likely to be a function of family values or their income. In contrast, when little family discretion is exercised, need will be most important, since among the model components it most nearly reflects physical conditions in the family.

Use of health services is generally assumed to involve less discretion than the purchase of most consumer goods and services. Certainly, family response when a child breaks an arm varies much less with predisposing and enabling family characteristics than does response to perceived need for family transportation, clothing or even food. Among types of medical services family discretion is assumed to be lowest for hospitalization, intermediate for physician services, and highest for dental care.

Kriesberg's review of trends in the relationship between socio-economic rank and utilization of different types of health services supports the above assumptions and emphasizes that they are relative to a broader societal change. He found that high positive relationships existed between socio-economic rank and utilization of hospital and physician services in 1930. By the early 1960's these positive relationships had disappeared for hospital use and had decreased considerably for physician use. He suggested that such reductions are primarily due to changes in situational factors (very similar to the enabling component of this model) such as the development of health insurance, which allowed poorer people to attain care.

In contrast, the high positive correlation between socioeconomic rank and dental use found in 1930 continues to exist into the current decade. Kriesberg concluded that situational and, in addition, cultural (similar to the predisposing component) differences such as values regarding dental care accounted for this continuing relationship.[27]

The current use of the hospital for practically all childbirths illustrates the absence of family discretion.[28] Further, Anderson and Sheatsley, in their study of some 2000 nonobstetrical hospital admissions in Massachusetts, point out that hospital services and hospital-based physician services

[27] Kriesberg (1963).

[28] NCHS (1967, Series 21, No. 11, pp. 24–25).

involve less discretion on the part of the patient than do non-hospital-based physician services:

> The patient exercises judgment and discretion whether or not to seek physician services. . . . Once the patient has sought physician services, the patient's judgment and discretion are greatly reduced and the patient begins to follow the physician's judgment and discretion. The clear impression from the evidence in this survey is that patients overwhelmingly tend to follow physicians' recommendations regarding hospital related physicians' services as reported by both patients and physicians.[29]

Use of dental services generally depends even more on family discretion than does use of non-hospital-based physician services. There is a great deal of family discretion exercised, for instance, regarding whether or not a child will go to an orthodontist to have his teeth straightened. Such predisposing and enabling conditions as judgments regarding the value of such care and whether the family can afford it are particularly important.[30]

Hypotheses

The formal hypotheses presented below are derived from the model. Their common purpose is to explain differences in quantities of health services families use. They are stated at the most general level in terms of predisposing, enabling, and need components. Ideally, these hypotheses should be extended to the subcomponent and even variable level. However, because of the complexity of the problem of health service use and the relatively early stage of development of the literature relating theoretical concepts to empirical findings, this study must still be considered, in large part, exploratory. Hopefully, the results will lead to further specification of hypotheses.

Hypothesis I. The amount of health services used by a family will be a function of the predisposing and enabling characteristics of the family and its need for medical care. Each of the three components will make an independent contribution to the understanding of differences in use of health services.

[29] Anderson and Sheatsley (1967, p. 84). In addition to the discretion involved in seeking physicians' services for relatively serious conditions which result in hospitalization, the patient or his family of course exercises even more discretion with respect to the more routine physician out-patient services they receive. This would be particularly true of preventive health services which represent a not inconsequential proportion of physician out-patient services. For example, of all persons reporting a physical examination within one year in the most recent HIF-NORC study, one-third reported it was a preventive exam (not for symptoms or required). Andersen and Anderson (1967, p. 21).

[30] Of course, a considerable amount of non-discretionary care is provided by dentists. An excruciating toothache can obviously impel response. However, a considerable and growing amount of health services is of the preventive variety. Thus the most recent data from the National Health Survey show that almost one-fifth of all dentist visits are for cleaning or straightening of teeth, while at the other extreme only 15 per cent are for extractions. NCHS (1965, Series 10, No. 23, p. 4).

Hypothesis II. The explanatory components of the model will vary in their contribution to the explanation of total use. Need will be more important than the predisposing and enabling components because it represents factors most directly related to use.

Hypothesis III. The contribution of each component will vary according to type of health service: (1) the contribution of need will be greatest for hospital services because these are defined as most necessary and the family has least discretion in choosing alternative actions; (2) the contribution of the predisposing and enabling components will be greatest for dental services because these are defined as least necessary and the family has most discretion in choosing alternative actions; (3) all of the components will contribute to understanding physician services because they are defined as less necessary than hospital services but more necessary than dental services.

This chapter has developed the model and hypotheses for the study. Before turning to the empirical testing of these hypotheses, the nature and construction of the dependent variables, health service use measures, will be explored in Chapter III.

CHAPTER III

MEASURING FAMILY USE OF HEALTH SERVICES

Families' use of services provided by the health services system is the dependent variable of this study. Use of physician and hospital services might be viewed as the "product" of the system. However, it can also be viewed, as is done in this study, as an indicator of individual and family behavior. Accordingly, utilization of health services includes elements of each of the major types of patient behavior studied in medical sociology.

These categories of patient behavior are health behavior, illness behavior, and sick-role behavior. Health behavior is "any activity taken by a person who believes himself to be healthy, for the purpose of preventing disease or detecting disease in an asymptomatic stage." A physician visit for a general physical examination would be health behavior. Illness behavior is "any activity undertaken by a person who feels ill, for the purpose of defining the state of his health and of discovering suitable remedy." A physician visit in response to a symptom of illness would be included in this category. Sick-role behavior is "the activity undertaken by those who consider themselves ill for the purpose of getting well." Repeated physician visits or taking prescribed medicine during an episode of illness are examples of sick-role behavior.[1]

This chapter discusses the ways patient behavior is measured in this study. The first section describes the methods used to obtain measures of the family's use of each type of service as well as a summary measure of all types of use combined.[2] The second section considers the effectiveness of the measures for including medical care received at no cost to the family. The final section employs these measures to show how families differ in the volume and type of services they consume.

MEASURES OF USE

In order to compare magnitudes of total use among families or to compare the amounts of different types of services used, some common denominator is necessary. The monetary unit is sometimes used for this

[1] Kasl and Cobb (1965, p. 2).

[2] A description of the services included in each category is found in Appendix B

purpose. It is an appropriate measure to study family *expenditure* for health services. However, it is not an adequate measure of family *use* because of the variation found in the price per unit of service.

Charges for comparable medical services may differ for several reasons.[3] The price for a particular service may vary with the ability of the customer to pay. A "sliding scale" is used by some practitioners and hospitals. Thus, expenditures as indicators of use are positively biased for high income families and negatively biased for low income families.

Family expenditures are also imprecise measures of use because free care is available to people with very low incomes or other special characteristics such as old age, disability, or blindness. The quantity of services utilized by these people is greater than family spending would indicate.

Finally, medical care prices vary from place to place. Costs for various types of services differ according to geographical location and the rural-urban nature of the area. Thus, if expenditures are accepted as measures of use, families living in areas with the highest medical care prices will appear to consume more services than they actually do.

Quantities of presumably comparable medical care services are also employed as measures of use. For instance, hospital care can be measured by number of admissions or days of care per year, and physician services can be measured by number of physician visits per year.

The major weakness of using quantities to measure use is the absence of a common denominator. There is no way to combine or compare quantities of unlike services. It is impossible to sum physician out-patient visits and hospital days to arrive at one measure of services used. Neither is one able to compare the amount of services used on an out-patient basis with those used in the hospital.

In sum, expenditures and quantities both have advantages and disadvantages as measures of use. Expenditures allow different types of services to be summed and compared. However, the price of a particular service may vary from patient to patient. Quantities permit more accurate comparisons of amount of use of a particular service, but there is no way for diverse services to be summed and compared.

The approach to measuring health services employed in this study incorporates the assets of both expenditures and quantities as measures of use and attempts to minimize their weaknesses. It involves weighting the various types of services by "standard prices." Actual quantities of services consumed are weighted by these standard prices. The resulting "dollar equivalents" or "units of use" can then be added to find one measure of use for all services combined. The method allows the same manipulations

[3] Feldstein and Carr (1964, pp. 22–25).

which can be done with expenditure data but controls for differences in prices. Discussions of how this general approach is applied to hospital use and physician use follow.

Hospital Use

The basic unit of use for hospital care is the hospital day. For each member of the sample, the total number of days spent in a hospital during 1963 was determined. These days are classified according to type of accommodation (private, semi-private, or ward) and type of admission (surgical, medical, or obstetrical). This information was verified whenever possible through the admitting hospital.[4]

It was therefore possible for an individual to have up to nine types of hospital days, classified according to the reason for admission and the accommodation as indicated below:

Type of Accommodation	Type of Admission		
	Surgical	Medical	Obstetrical
Private			
Semi-private			
Ward			

Each type of day was weighted. The weighting served to change days to units of use, allowing summation of different types of accommodations. In addition, the weights provided a way to take into account ancillary hospital services used for different types of admissions.

Type of accommodation is related to units of use consumed because of the different facilities typically allocated for each accommodation. These differences are reflected in varying prices. Hospital daily service charges reported in twenty major cities were used to arrive at standard weights for each of the nine types of hospital days described above.[5]

Almost half of the charges for hospital in-patient care are for ancillary services such as laboratory, drugs, operating room, anesthesia, X-rays, etc. In order to include these ancillary services in the hospital use index, the standard daily service charge for each type of hospital day was increased in accordance with the ratio of ancillary service charges to room and board charges for that type of hospital day computed from survey information.[6]

[4] This verification procedure is described in Andersen and Anderson (1967, pp. 176–177).

[5] Bureau of Labor Statistics (1962).

[6] An alternative approach for including hospital ancillary services in the consumer price index has been suggested by Scitovsky (1964, p. 136).

For example, the standard daily service rate for medical admissions with private accommodations was calculated at 31.2 units a day. The ratio of ancillary services to room and board services for medical admissions according to actual expenditure data from the 1963 survey was .73. Total units of use assigned for every hospital day of this type were then determined as follows:

$$31.2 + (.73)(31.2) = 54 \text{ units of use}^{7}$$

Total hospital care for the individual was determined by summing all hospital services used by the individual for the survey year. Family hospital use was subsequently constructed by summing the scores for all members of the family.

Physician Use

The basic units of physician use selected were physician visits and in-hospital surgical procedures. These units were considered to represent, in the main, the services provided by the physician to the patient.

The units were weighted according to "relative values" based on fees charged by California physicians in 1960 for various types of visits and surgical procedures.[8] A relative value unit is not the same as a dollar equivalent unit. Consequently, it was necessary to multiply each relative value unit by a constant (value of five) so that the resulting unit weight for physician services would approximate the dollar equivalent unit employed in the hospital use index.[9] To illustrate, suppose a person had three physician office visits and an appendectomy performed during the survey year. The relative value of the office visit is one and the relative value of the appendectomy is 40.[10] Total physician use units assigned to that person would be calculated as follows:

$$5[1(3) + 40] = 215 \text{ units}^{11}$$

As in the hospital index, total physician use for the individual was determined by summing the dollar equivalents for the various types of services. Total family use of physician services was calculated by summing individual physician use for all family members.

[7] Details regarding the hospital use index are found in Table B-1, Appendix B.

[8] California Medical Association (1960).

[9] A comparison of units assigned for a sample of procedures to actual charges for those procedures indicated that five would be the appropriate constant. Multiplication of the relative value of each procedure by five would result in magnitudes approximating "dollar equivalents."

[10] California Medical Association (1960, pp. 5–41).

[11] Details regarding the physician use index are found in Table B-2, Appendix B.

Other Measures of Use

Expenditure data, but not use data, were collected for drugs, dental services, and "other" care such as prostheses, medical appliances, and the services of non-M.D. practitioners so that the index method could not be used. For these types of services actual dollar expenditures by the family were substituted for units of use. All of the problems of using expenditure data to substitute for measures of use thus apply to these components. However, the effect is less serious than it would have been if the substitution of expenditures had been made for hospital or physician services. Almost all care provided at no cost to the patient or his family in 1963 was in the latter categories.[12]

Total use of services was calculated by adding together the units of use for the family for each type of service. In effect, then, total family use was a summation of "dollar equivalents" of family use for hospital and physician services and actual family expenditures for dental, drug, and "other" care.

MEASURING FREE CARE

A basic reason for constructing the index of health service use rather than using expenditures to represent use was that private family expenditures for personal health services do not reflect all of the health services families use. The use index is an attempt to include services which are provided at no cost, or at reduced cost such as those provided to medically indigent patients.

One method of evaluating the extent to which the index achieved this purpose is to first calculate dollar expenditures in the sample as a proportion of units of use. Subtracting this proportion from one provides an estimate of free care received by the sample as a proportion of total care received. This estimate of the care received at no direct cost to the consumer can then be compared with a similar estimate from an independent source.

One such source is the Social Security Administration (SSA). It makes estimates of consumer expenditures for personal health services. SSA also makes estimates of total expenditures for personal health services including those made by other sources such as government and philanthropy.[13] Consumer expenditures as a proportion of total expenditures provides an independent estimate of the relative amount of care received by the population at no direct cost.

Table 1 shows that about three-fourths of all the health services con-

[12] Evidence supporting this point follows later in the chapter. See Table 1.

[13] Reed and Hanft (1966, pp. 3–19).

sumed by individuals in 1963 were paid for directly by private consumers according to data from the Social Security Administration. The remainder was paid for by the federal, state, and local governments, philanthropy and other sources. Table 1 also shows that expenditures for health by families in the study sample were 84 per cent of the units of use they consumed according to the use index employed here. The eight percentage point difference between the two estimates indicates that while some free care is represented by the use index, the total amount of free care may still

TABLE 1

ESTIMATES OF THE PROPORTION OF PERSONAL HEALTH SERVICES PAID FOR DIRECTLY BY THE CONSUMER

Type of Service	SSA Consumer Expenditures as a Per Cent of Total Expenditures[a]	Study Sample Family Expenditures as a Per Cent of Units of Use
Total	76[b]	84
Hospital	59	59
Physician	93	99
Drugs	97	100
Appliances	97	100
Dental	99	100

[a] Derived from Reed and Hanft (1966, pp. 3–19). Based on U.S. civilian resident population as of July 1, 1963. Total expenditures based on total population including armed forces and federal civilian employees abroad as of July 1.

[b] Includes all expenditures for health service and supplies other than: (1) net cost of insurance; (2) government public health activities; and (3) expenditures of private voluntary health agencies.

be underestimated by this method. Actually, the differences are exaggerated because SSA's aggregate expenditures include those for institutionalized persons, who consume large quantities of health services not represented by the expenditures of the private sector of the economy. They are most likely to have their health services paid for by the government. In contrast, the study sample excludes these institutionalized people.

The two estimates show consumers paying for the same proportion of hospital care they receive. In fact, this study's estimate of the amount of free care received by the non-institutionalized population is probably greater than the SSA estimate would be if the population bases were exactly comparable. The SSA total expenditures include those for government hospitals which usually provide care at little direct cost to the patient.

Since many patients of government hospitals are long-term, institutionalized persons, they would not be included in the NORC sample.

Most of the difference between the two sets of data is accounted for by physician care. The study estimate shows only one per cent free care compared to seven per cent for SSA. One reason for this discrepancy might be that certain types of physician services were not adequately represented in the use index.[14]

The SSA data for drugs, appliances and dental care show that relatively few of these services were provided free to consumers. Since actual dollar expenditures were used to represent use of these services in the study sample, the implicit assumption is that no free care was provided. The estimates from SSA indicate that the assumption of no free care leads to only small biases.

In sum, the use indexes for this study tend to overestimate the extent of free hospital care and underestimate other types of free care. This means that hospital care probably appears to be a greater proportion of total use than it actually is while physician use as a proportion appears lower. However, the magnitude of these errors does not appear large enough to nullify the value of the indexes. For the purpose of this study the indexes of use appear to adequately represent family use patterns, allow summation of different types of services without grossly misrepresenting the relative weights of each, and permit some quantitative comparisons of the relative use of different types of services.

DIFFERENCES IN USE

This study was undertaken to understand better the differences in the amount of health services families use. The extent of these differences is indicated by Table 2. This table shows the distribution of families by the total units of health service they consumed during the survey year. The wide range in use is highlighted by the finding that almost one-tenth of the families used less than 25 units while at the other extreme one-tenth of the families used 1000 units or more.

The distribution is positively skewed. Families tend to be clustered at the lower end of the use distribution. Almost 60 per cent of the families used fewer than 300 units. One-half of the families used 200 units or less. The arithmetic mean is 439 units, or over twice the median. The mean is much higher because a relatively small proportion of families accounted for a large proportion of all services consumed. The nature of this distri-

[14] For instance, consultations between doctors would not be represented by patient visits to doctors. In addition, the constant of five used to convert "relative value units" into dollar equivalents or use units may have been somewhat conservative.

bution indicates the need to understand the characteristics of the relatively few extraordinarily high use families to explain distribution patterns.

Distributions of use for types of services differ considerably from each other and from the distribution for total use as shown in Table 3. The first column shows that almost all families used some type of health services during the survey year. The types most likely to be used were physician services and drugs. While physician services and drugs were used by nine-tenths of the families, dental services and other medical care were each used by about three-fifths of the families. In-patient hospital services were least likely to be used. Slightly more than one-quarter of all families had one or more members admitted to a hospital during the survey year.

TABLE 2

NUMBER OF UNITS OF HEALTH SERVICES FAMILIES USE

Units of Use	Per Cent of All Families
0–24	9
25–49	7
50–149	23
150–299	20
300–599	20
600–999	10
1000–1999	8
2000 or more	3
Total per cent	100
Number of families	(2367)

TABLE 3

TYPES AND AMOUNTS OF HEALTH SERVICES FAMILIES USE

Type of Service	Per Cent Families Using Service	Mean Use[a] per Family	Mean Use[a] per Family Using Service
Total	99	439	445
Hospital	28	169	570
Physician	89	116	131
Drug	94	75	84
Dental	59	48	82
Other	57	35	62
Number of families	2367	2367	2367

[a] Units of health service use.

Although hospital services were less likely to be used during a given year, the second column of Table 3 shows that the hospital component of total use was the largest of all components. The mean number of units consumed in hospital services was 169 per family compared to 116 units for physician services which was next largest. Average drug use was third in order of magnitude followed by dental use and other care in that order.

Because the proportion of families using services differs so much from type to type, mean use for all families does not give an accurate picture of magnitude of use for those families actually using services in a given year. The last column of Table 3 shows that families with hospital admissions consumed, on average, 570 units in hospital services during the survey year. Families using physician services averaged 131 units. Compared to column 2, the differences in average use of these services appear much greater because most families use physician services while a much smaller proportion use hospital services. However, when families do have hospitalizations, the average number of hospital units consumed is over four times the average number of physician units used.

Similar contrasts appear between drugs and dental services. Drugs, like physician services, were used by most families while dental services were used by a smaller proportion of all families. Consequently, while mean use of drugs is half again as large as mean use of dental services in column 2, the mean units of each service for families actually using services was about the same (84 units for drugs vs. 82 units for dental services).

The previous tables have shown that families differ considerably in the total amount and the type of services they use. Table 4 indicates how a family's use of one service correlates with their use of others. The size of these correlations ranges from a high of .55 between hospital and physician use to a low of −.01 between hospital and dental use. In general, use of hospital, drugs, and other services tends to correlate most highly with

TABLE 4

CORRELATIONS[a] AMONG DIFFERENT TYPES OF HEALTH SERVICE USE

Type of Use	Hospital	Physician	Drug	Other	Dental
Hospital (4)[b]	1.00				
Physician (7)	.55	1.00			
Drugs (10)	.17	.38	1.00		
Other (11)	.09	.26	.28	1.00	
Dental (12)	− .01	.07	.11	.12	1.00

[a] Pearson Product-Moment Correlations.

[b] The numbers in parentheses after each variable in this and subsequent tables refer to a definition and marginal distribution of the variable found in Appendix B.

physician use, while dental care does not correlate highly with any other type of use.

The relatively high correlations of most services with physician use probably highlights the physician's role as decision maker and "gatekeeper" for the medical care of his patient. This is true not only for physician services but also for other types of services the patient uses as part of the medical regimen. Dental services fall outside of this medical regimen. The dentist practices independently from the physician, and most of his patients are not ill in the traditional medical sense. Consequently, the intercorrelations of dental use and other types of use are low.

However, the correlations suggest that families vary considerably in their relative use of other services as well. The highest correlation, that between hospital and physician use, indicates that only 30 per cent of the variance in either type of use is attributable to the relationship between them.[15] The next largest correlation is .38 between drugs and physician use. In this case the proportion of the variance in either of the measures attributable to the other is only 15 per cent. These correlations indicate that families who are large consumers of one service are not necessarily large consumers of another.

With the help of a use index based on dollar equivalents, this chapter has documented considerable differences among families regarding the amounts and types of health services they use. The following two chapters will analyze these differences employing the model of health service use previously developed.

[15] The variance is equal to r^2. See Walker and Lev (1953, pp. 243–244).

CHAPTER IV

DIFFERENCES IN THE VOLUME OF SERVICES FAMILIES USE

This chapter is an analysis of differences in the total amount of health services families use. It considers these differences with the framework of the behavioral model of health service use developed in Chapter II. Specifically, the first two hypotheses of the study concerning total volume of services consumed are investigated here:

Hypothesis I. The amount of health services used by a family will be a function of the predisposing and enabling characteristics of the family and its need for medical care. Each of the three components will make an independent contribution to the understanding of differences in use of health services.

Hypothesis II. The explanatory components of the model will vary in their contribution to the explanation of total use. Need will be more important than the predisposing and enabling components because it represents factors most directly related to use.

We will first examine the simple correlations between use and the variables representing each component and subcomponent of the model. These correlations show the magnitude and direction of basic relationships. The following section shows the results of an analysis of variance designed to provide evidence regarding more detailed relationships suggested by the model.

CORRELATION ANALYSIS[1]

Table 5 shows that each component of the model is correlated with families' use of health services. The need component, as expected, is most closely associated with use.[2] Families who report the most illness and those who are most likely to see a doctor for symptoms of illness and physical examinations tend to use the most health services. Number of disability

[1] The meanings of these correlation coefficients and the differences between the PHI and TAU coefficients are discussed in Appendix A. In general TAU is more sensitive to monotonic relationships while PHI indicates any type of association between the variables.

[2] To help in explaining what these correlations mean, the cross tabulations which produce them were examined. These tables are not included with the report because of the large number produced (one for each correlation coefficient).

TABLE 5

CORRELATIONS OF EXPLANATORY VARIABLES WITH TOTAL USE (2)

INDEPENDENT VARIABLE		CORRELATIONS	
		TAU	PHI
Predisposing			
Family Composition	Family size (15)	.24	.40
	Sex of head (17)	−.14	.18
	Marital status of head (18)	—	.31
	Age of head (19)	−.04	.22
	Age of oldest member (21)	*	.21
	Age of youngest member (23)	−.18	.33
Social Structure	Employment of main earner (26)	—	.23
	Social class of main earner (28)	.08	*
	Occupation of main earner (30)	.07	.21
	Education of head (32)	.07	.17
	Ethnicity (35)	.04	*
	Race (36)	.09	.15
Health Beliefs	Value of health services (38)	.08	.21
	Value of physicians (40)	*	*
	Value of good health (41)	*	*
	Value of health insurance (43)	−.04	.11
	Attitude toward health services (45)	.06	*
	Attitude toward physician use (47)	.04	*
	Knowledge of disease (49)	.04	*
Enabling			
Family Resources	Income (51)	.20	.30
	Savings (52)	*	*
	Health insurance (54)	.18	.21
	Regular source of care (55)	.15	.32
	Welfare care (56)	.05	.14
Community Resources	Physician ratio (57)	*	*
	Hospital bed ratio (58)	*	*
	Residence (59)	*	*
	Region (60)	—	*
Need			
Illness	Symptoms (62)	.27	.37
	Disability days (63)	.45	.63
	Health level (65)	.23	.31
	Free care for major illness (66)	.10	.22
Response	Seeing doctor for symptoms (67)	.20	.41
	Regular physical examinations (69)	.16	.34

* Not significant at the .01 level.

— Not computed.

days was the best single predictor of family total use of health services although all the measures of need showed statistically significant and substantively meaningful relationships to health service use.

The predisposing component represented by the family composition variables followed need in magnitude of correlation with use. Family size was the best single predictor of use among these variables. Generally, large families, those with young children, and those headed by younger persons and married persons tend to be the highest users. These characteristics are intercorrelated and together describe families in the reproductive and child nurturing phases of the family life cycle.[3]

Family resources had correlations with use of magnitudes similar to family composition although no predictor was as strong as family size. Income was the family resource best able to account for differences in use patterns. Families with high incomes and health insurance coverage used more services than those with low incomes and no health insurance. In addition, the volume of services used is related to the family's regular source of medical care. The amount of care used is least for families with no regular source, intermediate for those who claim a clinic or general practitioner as their regular source of care, and greatest for those who report a specialist as their primary physician. Families who receive welfare care use more services than those who do not. Savings is not related to use.

Social structure and health beliefs are predisposing conditions which showed some significant relationships to total use in Table 5, but the magnitude of these correlations tended to be lower than those for other subcomponents. Health beliefs, in particular, showed low correlations with use.

With regard to the social structure subcomponent, families who have a main earner who is employed full time in an occupation of high social prestige tend to use the most services. Families with main earners who are unable to work also use large quantities of services, probably because families with any disabled member tend to be large consumers of medical care. Lower class families and those with unemployed main earners tend to use less medical care. Use increases as education of the head increases and is greater for whites than non-whites. Ethnicity is unrelated to use.

The correlations for health beliefs are as expected except for value of health insurance. Positive values and favorable attitudes toward health

[3] Further examination of these correlations along with the multitude of contingency tables which produced them indicates that aging families and those with widowed, divorced, or separated household heads are also high users. In contrast, young, single individuals and young, married couples without children tend to be low users.

and higher levels of knowledge about illness are health beliefs associated with high use. However, families with a negative attitude toward insurance tend to use more services.[4]

Community resources, which are defined in the model as enabling conditions, have no statistically significant correlations with use. Families did not differ in their use of health services according to the number of doctors or hospital beds in their community or according to the nature of the community itself.

In sum, Table 5 shows that families probably differ most in their use of health services because of varying needs created by illness. In addition, the predisposition of the family toward services as measured by family composition and their ability to secure services as measured by family resources play an important role. Social structural characteristics and health beliefs are less important and, according to data for this study, community resources have no significant influence on family use.

AID ANALYSIS

The analysis of total family use up to this point has relied on simple correlation coefficients. While these coefficients provide an overall picture of the relationship between each variable and use, they do not take into consideration the interrelationships of the variables or the sequence of conditions ultimately leading to use as postulated by the model. The remainder of this chapter takes up these problems.

A computer program developed by Sonquist and Morgan called Automatic Interaction Detector—Version 2 (AID) was used to apply the model.[5] The program divides the sample, through a series of dichotomous splits, into a mutually exclusive series of subgroups.[6] It seeks to answer the question, "What single predictor will give a maximum improvement in ability to predict values of the dependent variable at any stage of the analysis."[7]

[4] It may be that some families who use large quantities of services are disappointed by the inability of their insurance to cover a large enough proportion of their expenditures and thus they develop somewhat negative attitudes toward insurance in general.

[5] Sonquist and Morgan (1964).

[6] A description of the program algorithm is found in Appendix A.

[7] Certain terminology which will be used throughout this analysis should be considered:

a. Total *variation*, or total sum of squares (TSS), is the sum of the squared deviation of each value of the dependent variable (Y_a) about the mean of the dependent variable for all observations ($\bar{Y}$): $TSS = EE\,(Y_a - \bar{Y})^2$. Winer, (1962, p. 50).

b. A *variance*, or mean square (MS), is the average variation per degree of freedom df: MS = TSS/df where

$$df = \begin{pmatrix}\text{no. squared}\\ \text{deviations}\end{pmatrix} - \begin{pmatrix}\text{no. independent points about which}\\ \text{deviations are taken}\end{pmatrix}$$

Winer (1962, pp. 50–51).

The dependent variable for the AID analysis is a sum of the total units of use for each family expressed in terms of logarithms.[8] The potential predictors were determined through the correlation analysis. Any variable not significantly related to total use according to either the TAU or PHI coefficients in Table 5 was not included in the AID analysis. The assumption was that there is little chance for such a variable to contribute to the explanation of differences in use. All other variables listed in Table 5 were included.[9] Thus, all of the family composition variables are included as possible predictors while all of the community resource variables are excluded. Of the 34 independent variables, 27 are included as possible predictors of total use.

The general strategy in this study was to try to explain variation or differences in family use in three separate stages. Predisposing conditions, which are considered to be prior in the causal chain influencing family use of services, were utilized first to account for differences. Next, enabling conditions, which in part flow from predisposing characteristics but also have independent effects, were used to explain differences in use not acacounted for in the first stage. Finally, family need, which is presumed to have the most direct influence on use, was employed to account for differences remaining after the first two stages.[10]

Age of family head and family size were included at each stage of the analysis even though they are designated as predisposing conditions. They were included because they were thought likely to interact with enabling conditions and need in explaining variation in family use.[11] For example, a large number of disability days spread over several members of a large family may have different implications for use of services than would a similar number of days experienced by a single person or a two member family. Many disability days for a small family are more likely to signify a serious illness. The strategy of reintroducing size at each stage of the analysis would allow such an interaction effect to be detected.

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c. When a predictor is used to divide the sample into subgroups it is described as *explaining* of *accounting for* variance in the dependent variable. Sonquist and Morgan (1964, pp. 7–9).

d. The *effects* of a predictor are basically the differences between the mean values of the dependent variable for the parent group and those of the subgroups resulting from the split. Winer (1962, pp. 146–151).

[8] A discussion of the transformations used for the measures of use is found in Appendix A.

[9] It was necessary to alter the categories of the independent variables in some instances for use in the AID analysis. These changes are discussed in Appendix A.

[10] Introducing variables in different stages of the analysis according to assumed causal priorities is discussed and illustrated by Sonquist and Morgan (1964, p. 105).

[11] This strategy is suggested by Sonquist and Morgan (1964, p. 49).

Table 6 shows that of the 27 possible predictors 10 were actually used in the AID analysis. Seventeen predictors were not used, showing that at each step of the analysis there existed another variable which proved more useful in explaining the remaining variance.

Substantively, the results in Table 6 tend to support both of the general hypotheses. Predisposing, enabling, and need components each make a contribution to the explanation of differences in family use of health services.[12] Further, the proportion of the variance explained by the need component was the largest.

Among the predisposing variables, family size and age of oldest member were selected for use by the AID program, showing the importance of family composition for explaining differences in families' use of health services. The effect of size was greater than that of any other predictor. Social structure was represented by employment of main earner and race.

[12] See footnote a, Table 6.

TABLE 6

VARIANCE EXPLAINED IN AID ANALYSIS OF TOTAL USE

Predictor	Variance Explained[a]
Predisposing	
Family size	.15
Age of oldest member	.01
Employment of main earner	.01
Race	.01
Enabling	
Health insurance	.02
Welfare care	.01
Regular source of care	.03
Need	
Disability days	.14
Regular physical examinations	.02
Seeing doctor for symptoms	.04
R^{2}[b] (Total)	.43[c]

[a] In this and subsequent tables "variance explained" refers to portion of total variation (TSS_T) accounted for by predictor X and is equal to $\epsilon TSS_{ix} - \epsilon TSS_{jx}/TSS_T$ where i is over all parent groups split by predictor xj, and j is over all new groups formed by splitting a parent group on predictor x. See the program algorithm in Appendix B. For other basic formulas used in the AID program see Sonquist and Morgan (1964, pp. 145–148).

[b] R^2 equals total proportion of the variance explained by the analysis in this and following tables. This "R^2" corresponds roughly to the "R^2" of a multiple regression procedure. See Sonquist and Morgan (1964, p. 50).

[c] Subcomponents do not equal total because of rounding error.

However, Table 6 shows that the contribution of these social structure variables was small compared to that made by size. No health belief variable accounted for any of the difference in use in this AID analysis.

Enabling conditions shown to influence use were health insurance coverage, use of welfare services,[13] and source of regular medical care. The relative contribution of these predictors was greater than that of the social structure predictors but considerably less than that of family composition.

Note that the zero-order correlations of income with total use shown in Table 5 are higher than those for employment of main earner and race. Yet, the latter two were used in the AID analysis while income was not. However, employment of main earner and race are predisposing variables and were thus introduced in the first stage of the analysis. Income, as an enabling variable, was in the second stage. Apparently, the social structure variables and income account for the same variation in use. Consequently, little variation in use which could be explained by income is left for the second stage of analysis. The model suggests in this case a process in which family social structure (employment of main earner) influences enabling resources (income), which in turn influence use of health services.

Need was subject to a quite stringent test by the statistical approach. Need was not introduced until the third stage of the analysis because it is considered to be the most immediate cause of use. Consequently, all of the variation in use that could be explained by predisposing and enabling conditions was already accounted for. In a sense, the relationships between need and use were being examined, controlling for the influence of these other conditions.[14] Consequently, the fact that need, even under these restrictions, accounted for the most variance indicates its overall importance.

Table 6 shows that disability days is the most important variable within the need category. Symptoms and general health level, while showing relatively high zero-order correlations in Table 5, did not explain any variance in the AID analysis, presumably because they are highly correlated with disability days. Both regular examinations and seeing a doctor for symptoms were used. These predictors, along with disability days, make need the most important component within the model.

Table 6 shows the results of the AID analysis. However, it does not

[13] Welfare care is an enabling condition in that it is a source through which a family can receive services. In addition, however, it reflects use of services since the family actually had to make use of welfare care, rather than just be eligible, to be coded positively.

[14] Sonquist and Morgan (1964, p. 48).

suggest the steps leading to the results nor does it indicate interaction effects among the predictors. Figure 1 provides a more detailed view of the analysis. For each stage it shows: (1) the splits taking place with the resulting classes of predictors in each sub-group; (2) the mean of each sub-group; (3) the number of families (N) in each final group;[15] and (4) the proportion of the total variance explained by each stage of the analysis.

The splits are ordered according to the unexplained variance they account for. Thus, in Stage I the first split dividing families into sizes of one and two or more accounted for more of the difference in total use than any other potential dichotomous split for any predisposing predictor. The next most important split divided families of two or more into those consisting of two persons and those with three or more. The graphic illustrations of the splits for each stage of the analysis are referred to as "trees."

The first group in the tree of Stage I indicates that the mean total use for all families in the sample for the survey year computed from logarithms to the base 10 equals 2.28. The rest of the tree shows which predisposing characteristics were best able to separate high use families from low use families.

Family size provided the initial split. Families with two or more members found in group 3 were high users as indicated by their mean log score of 2.36. In contrast, individuals living alone were low users as shown by their mean log score of 1.85 (group 2). Family size also accounted for the second best split (groups 4 and 5) with families of three or more persons using more health services than two person families.

The third split (groups 6 and 7) shows that race is important for relatively large families of three or more persons. White families have a higher mean use than non-white families. For two person families, the next split (groups 8 and 9) signifies that older couples with at least one member 35 or more use more services than the young couples in which neither member has reached 35 years of age. The last split (groups 10 and 11) indicates that at this point in the analysis, employment of the individual, of all possible predisposing variables, was the best predictor of use. The person who is unemployed or works only part time tends to use fewer services than other individuals living alone.

The ability of the AID program to detect interaction effects is illustrated by this tree. Note that for each family size a different predisposing variable was most successful in further differentiating higher use families from those with lower use. The variables were race for families of three or more persons; age for couples; and employment status for single per-

[15] The characteristics of these final groups are listed in Table B-3, Appendix B.

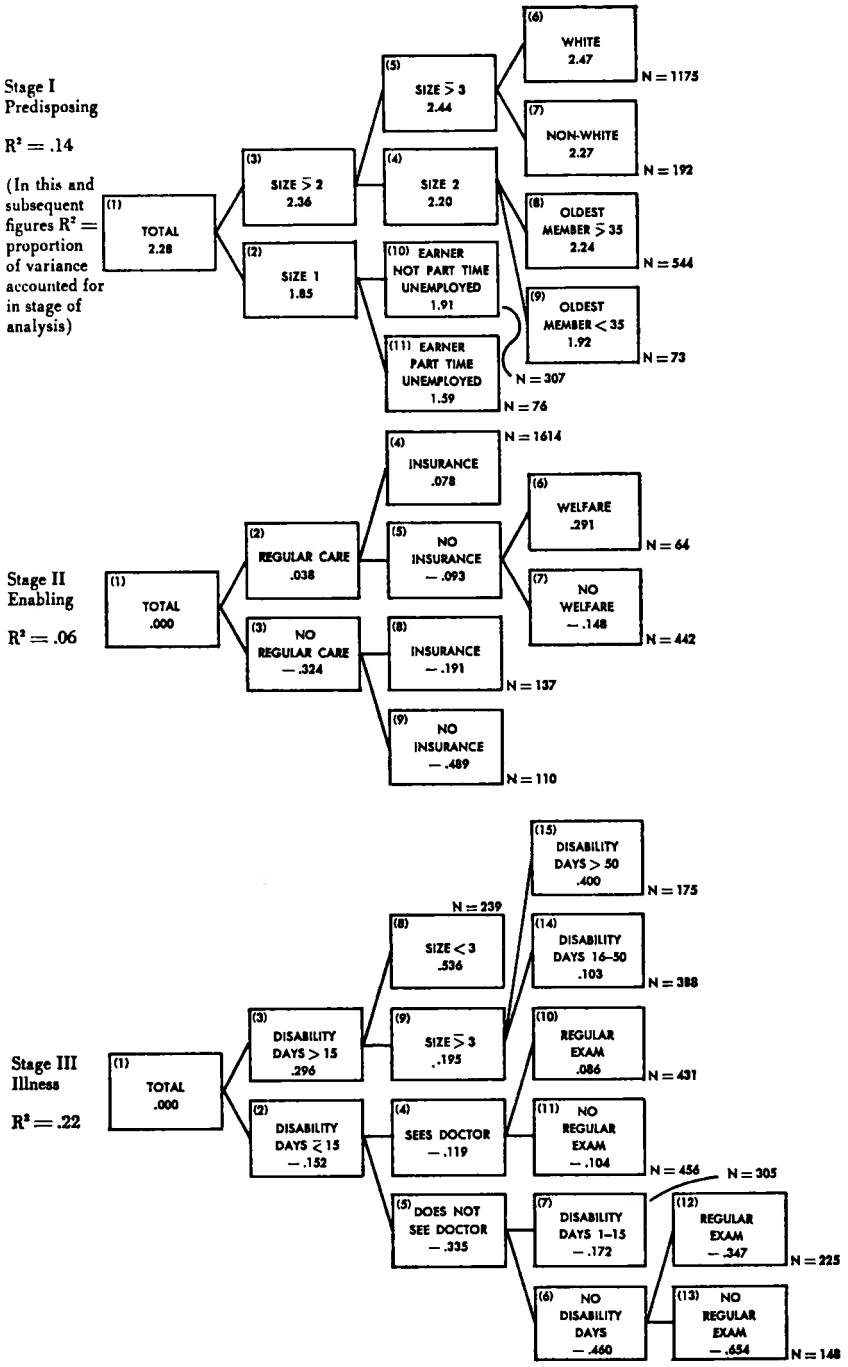

FIG. 1.—Predictor trees for AID analysis of total use

sons. These findings point up the complexity of the interrelationships of the dependent variables and the need for an analysis such as AID which seeks to take these complex interrelationships into consideration.

The steps in Stage II of the analysis of total use are displayed by the second tree in Figure 1. The dependent variable in this case was the residual of total use from Stage I. It included all of the variation in family use which was not explained by the predisposing conditions. The mean of the residuals for all families was zero. "Plus" scores represent higher use and "minus" scores represent lower use. The independent variables for Stage II were all of the enabling conditions which were significantly related to total use (Table 5) and, in addition, family size and age of family head.

The enabling characteristic first used to differentiate families was the presence of a regular source of care. Those families who had any type of regular source (whether it was a specialist, general practitioner, or clinic) used more services than those families with no regular source of care. Among those families with a source of regular care, those with health insurance were higher users than those without health insurance. However, those families without insurance still tended to be large consumers of health services if they availed themselves of welfare services. The lower section of the tree shows that insurance coverage was an important enabling condition for families without a regular source of care as well as for families with a regular source.

The steps in Stage III of the analysis are outlined by the third predictor tree in Figure 1. The dependent variable was again a residual of total use, but this time it included only the variation in use left after the effects of both the predisposing and enabling components had been accounted for. The potential predictors were all measures of need, and, again, family size and age of family head.

The primacy of disability days as a predictor of use is illustrated by the first split in the tree. Families reporting fifteen or more disability days are shown to be higher users than those reporting less disability. In each section of the tree, additional divisions are made on disability days to further emphasize the predictive importance of the variable.

Of particular interest in the Stage III tree is the evidence of interaction effects. Among high disability families (15 days or more), those with one or two members were shown to use *more* services than those with three or more. This is an illustration of a predisposing condition interacting with an illness variable to further explain use. Size is shown to have an influence in the opposite direction of that which it had in Stage I. Among families reporting relatively large numbers of disability days, *small* families made greater use of health services. A given number of disability days

in a small family was more likely to indicate a relatively ill person than the same number of days spread over several members of a larger family.[16]

Another interaction effect shown by the tree in Stage III occurs between disability days and the variables, seeing a doctor for symptoms of illness and regular examination. Among high disability families response to illness did not differentiate high users of health services from low users, but for lower disability families response accounted for no less than three divisions. As expected, families who reported seeing a doctor for symptoms and having regular examinations used more services. These findings suggest that in families where there is considerable illness (as measured by disability days), the general response of the family to symptoms and their tendency to use preventive services has little effect on the volume of services they use. However, for families with less illness, response is a much more important predictor of the volume of services.

CONCLUSION

The first hypothesis of the study—that predisposing, enabling, and need components of the health service use model would all contribute to an explanation of differences in families' use of health services—was generally supported. The correlation analysis showed significant relationships between variables representing each component and volume of health services used. Further, in the three stage AID analysis which attempted to take into account causal priority among these components, each was able to account for some variation in use.

The second hypothesis—that need would be a stronger predictor of use than the other components of the model because it is closest in the causal chain to use—also received support. Need does stand out as the strongest influence on use. The importance of need is indicated by both the zero-order correlations and the more stringent test provided by the AID analysis. In the latter instance, need is shown to be the best predictor of use even after predisposing and enabling components have been taken into consideration.

The findings suggest specifications of the relationships between the explanatory components of the model and use of health services beyond those stated in the original hypothesis. The predisposing component is a better predictor of use than the enabling component. This is not simply a function of the ordering of variables in the AID analysis, since the correlation analysis also tends to support the point.

[16] Other evidence shows that use per person decreases as size increases. NCHS (1964, Series 10, No. 9, p. 47). It may be that this tendency is strongest among families with considerable disability and is reflected in the third stage of this analysis.

The model implies that the simple correlations with use should be greater for the enabling than the predisposing variables because the latter are assumed to be "further removed" in the sequence of conditions leading to health services use.[17] However, higher correlations between use and family composition (a predisposing subcomponent) than between use and the enabling variables do not support this expectation. Family composition variables, including family size and age structure, reflect various stages of the family life cycle which is strongly related to need for and subsequent use of health services as pointed out in Chapter I. Consequently, the predisposing component of the model based on the importance of the family composition variables is apparently stronger than the enabling component.

Examination of other subcomponents of the model suggests further ways in which family use of health services can be clarified. For instance, social structure appears to be a more important predictor of health service use than health beliefs. Attitudes and beliefs of the family, particularly in the case of serious illness, seem to play a considerably less important part in determining volume of services used than might be expected. This reinforces the earlier characterization of health service use as being relatively non-discretionary in our society today.

While family resources appear to have considerable impact on utilization, the other subcomponent of the enabling component, community resources, showed no significant relationships. Neither the availability of health facilities, region of the country, or type of residence (urban-rural) influenced the volume of health services families use. Given ease of transportation and the growing homogeneity of different types of communities in this country, community resources may no longer represent important enabling conditions for securing health services.

Both the illness and response subcomponents of need showed strong relationships with use, as expected. However, because of important interaction effects, response to illness appears to be of major importance only for families in relatively good health (using discretionary services). Response is of less import in explaining the volume of services used by families with serious illness, who are more likely to be using non-discretionary services.

Understanding families' total use of health services is largely dependent on analyses of the types of services making up the total. The next chapter examines this premise.

[17] This reasoning regarding the interpretation of correlation coefficients follows that of Driver and Massey (1957, pp. 427–434).

CHAPTER V

DIFFERENCES IN FAMILIES' USE OF HOSPITAL, PHYSICIAN, AND DENTAL SERVICES

Separate analyses of hospital, physician, and dental use are presented in this chapter. These services are major components of the total volume of health services families consume. In addition, they are assumed to differ with respect to the amount of discretion or choice exercised by families in their use. It is postulated that discretion is highest for dental use, intermediate for physician use, and lowest for hospital use. Further, it is assumed that the importance of need in explaining use of health services will be directly related to the amount of discretion involved while the importance of the predisposing and enabling components of the model will be inversely related. These assumptions lead to the following hypothesis which is examined in this chapter:

Hypothesis III. The contribution of each component will vary according to type of health service: (1) the contribution of need will be greatest for hospital services because these are defined as most necessary and the family has least discretion in choosing alternative actions; (2) the contribution of the predisposing and enabling components will be greatest for dental services because these are defined as least necessary and the family has most discretion in choosing alternative actions; (3) the contributions of the different components will be most similar for physician services because they are defined as less necessary than hospital services but more necessary than dental services.

CORRELATION ANALYSIS

The results of the zero-order correlation analysis are given in Tables 7 and 8.[1] They show the relative importance of the predisposing, enabling, and need components for each type of use.

In general, the hypothesis suggests that the coefficients for the predisposing and enabling components should be large for dental care and small for hospital services. Conversely, for the need component the correlations

[1] Table 7 shows TAU correlation coefficients while Table 8 provides PHI correlation coefficients for the same variables. Differences between these coefficients and reasons for using both in the analysis are discussed in Appendix A.

TABLE 7

TAU CORRELATIONS OF EXPLANATORY VARIABLES WITH TYPES OF HEALTH SERVICE USE (6)

INDEPENDENT VARIABLE		CORRELATIONS		
		Hospital	Physician	Dental
Predisposing				
Family Composition	Family size (15)	.14	.26	.22
	Sex of head (17)	−.07	−.13	−.17
	Marital status of head (18)	—	—	—
	Age of head (19)	−.08	−.08	−.14
	Age of oldest member (21)	−.05	−.06	−.14
	Age of youngest member (23)	−.14	−.22	−.16
Social Structure	Employment of main earner (26)	—	—	—
	Social class of main earner (28)	*	.06	.21
	Occupation of main earner (30)	*	.06	.19
	Education of head (32)	*	.05	.24
	Ethnicity (35)	*	*	.06
	Race (36)	.04	.07	.14
Health Beliefs	Value of health services (38)	*	.07	.13
	Value of physicians (40)	*	*	*
	Value of good health (41)	*	*	.05
	Value of health insurance (43)	*	*	−.06
	Attitude toward health services (45)	*	.06	.06
	Attitude toward physician use (47)	*	.06	*
	Knowledge of disease (49)	*	.04	.09
Enabling				
Family Resources	Income (51)	.04	.15	.34
	Savings (52)	−.05	*	.15
	Health insurance (54)	.07	.14	.22
	Regular source of care (55)	.04	.16	.10
	Welfare care (56)	.06	.06	−.05
Community Resources	Physician ratio (57)	−.04	*	.12
	Hospital bed ratio (58)	*	−.04	.05
	Residence (59)	−.04	*	.07
	Region (60)	—	—	—
Need				
Illness	Symptoms (62)	.12	.30	.07
	Disability days (63)	.38	.45	.11
	Health level (65)	.15	.23	.06
	Free care for major illness (66)	.11	.12	−.04
Response	Seeing doctor for symptoms (67)	.08	.23	.08
	Regular physical examinations (69)	.07	.15	.06

* Not significant at the .01 level.
— Not computed.

TABLE 8

PHI CORRELATIONS OF EXPLANATORY VARIABLES WITH TYPES OF HEALTH SERVICE USE (6)

INDEPENDENT VARIABLES		CORRELATIONS		
		Hospital	Physician	Dental
Predisposing				
Family Composition	Family size (15)	.25	.39	.32
	Sex of head (17)	.12	.16	.20
	Marital status of head (18)	.16	.30	.25
	Age of head (19)	.22	.21	.30
	Age of oldest member (21)	.23	.20	.28
	Age of youngest member (23)	.34	.34	.32
Social Structure	Employment of main earner (26)	.16	.23	.32
	Social class of main earner (28)	*	*	.28
	Occupation of main earner (30)	.17	.18	.27
	Education of head (32)	*	*	.32
	Ethnicity (35)	*	*	*
	Race (36)	.07	.12	.18
Health Beliefs	Value of health services (38)	*	*	.21
	Value of physicians (40)	*	*	*
	Value of good health (41)	*	*	*
	Value of health insurance (43)	*	*	.12
	Attitude toward health services (45)	*	.18	.16
	Attitude toward physician use (47)	*	*	*
	Knowledge of disease (49)	*	*	.16
Enabling				
Family Resources	Income (51)	.13	.24	.43
	Savings (52)	*	.13	.21
	Health insurance (54)	.09	.17	.24
	Regular source of care (55)	*	.33	.17
	Welfare care (56)	.18	.14	.11
Community Resources	Physician ratio (57)	*	*	.19
	Hospital bed ratio (58)	*	.15	.15
	Residence (59)	*	*	.14
	Region (60)	.14	*	.20
Need				
Illness	Symptoms (62)	.19	.40	.12
	Disability days (63)	.52	.63	.21
	Health level (65)	.24	.30	.15
	Free care for major illness (66)	.26	.23	.09
Response	Seeing doctor for symptoms (67)	.17	.46	.15
	Regular physical examinations (69)	.16	.30	.20

Not significant at the .01 level.

should be high for hospital use and low for dental use. The coefficients for physician use should be relatively large for all components.[2]

Predisposing Component. Tables 7 and 8 substantiate the predictions for the predisposing component with respect to social structure and health beliefs, but not family composition. In general, the social position of the family and their beliefs about illness and medical care are most highly correlated with their use of dental services, somewhat less correlated with physician use and almost uncorrelated with hospital use. Substantively, these correlations indicate that families who are white, middle class, knowledgeable about disease, and positively inclined toward health services tend to use more dental services and have somewhat more contact with the doctor. Families who are Negro, working class, have less valid information about disease, and have a more negative outlook toward health services tend to use fewer dental and physician services.[3] Such characteristics are not related to the volume of hospital services families use.

Turning to family composition, while the hospital coefficients are the lowest, the values for the variables, family size and age of youngest member, are still fairly substantial. Further, the physician coefficients are as likely as not to be larger than the dental coefficients. These findings suggest that the size and age structure of the family has important effects on the volume of most types of health services.

The correlations for the family composition variables seem to indicate that families with several members, those headed by men, and those in relatively early stages of the family life cycle utilize more of all services than those of small size, those headed by women, and those in later stages of the life cycle. However, comparisons of the TAU and PHI coefficients and further examination of the contingency tables which produced them show deviations from the general description. Families in the early stages of the life cycle use relatively few health services but the dental component is a larger proportion of their total consumption than it is for families at other stages of development. In addition, while the overall TAU correlations show that the ages of the head of the family and the oldest member are negatively related to all types of use, families in the last stages of the life cycle still tend to use more hospital and physician services than all other families except those in the reproductive and child rearing stages.

[2] However, we might expect them to be somewhat smaller than the dental use coefficients for the predisposing and enabling components and somewhat smaller than the hospital use coefficients for the need component.

[3] The only correlations which do not fit this generalization are: (1) a small negative correlation between value of health insurance and use of dental services; and (2) a small positive correlation between degree of ethnicity and use of health services (see Table 7).

Enabling Component. The coefficients for the enabling component in Tables 7 and 8 support the hypothesis. The family's use of dental services generally shows the highest correlations with the enabling characteristics while the correlations with hospital use are lowest and those for physician use are in between. Enabling family resources defined in terms of higher income, some liquid savings, presence of health insurance, a regular source of care, and access to welfare care result in greater use of health services.

While the correlations, in the main, support the hypothesis, there were certain exceptions. The family's regular source of medical care (specialist, general practitioner, clinic, or none) is more highly correlated with volume of physician services than with volume of dental services, as might be expected. Further, while families receiving welfare care use more hospital and physician services than those not receiving welfare services, receiving welfare care is actually negatively correlated with use of dental services. This is not surprising, particularly in the light of evidence in Chapter II showing that little free dental care was provided in 1963. Welfare families typically have few other means besides the welfare system for attaining care. A final deviation is the negative correlation between amount of savings and use of hospital services. Families with members hospitalized during the survey year may have depleted their savings. In addition, illness to a wage earner may reduce income, forcing the family to draw on savings for everyday living expenses.

The correlations of community resources with each type of use tended to be small or non-existent. The significant ones are largely with dental use. As the physician-population and hospital bed-population ratios of the areas in which families live increase, their use of dental services also increases. There is probably little direct relationship between medical care resources and use of dental services. But, perhaps, families living in areas with high ratios also tend to use dental services. Medical care resources may be measures of community affluence and use of dental services is directly associated with such affluence. Regarding other community resources and dental use, urban families are shown to use more services than rural families. An examination of the contingency table providing the significant PHI correlation for region suggests that families in the East tend to use the most dental services and those in the South use the fewest.

The community resource coefficients for hospital and physician use suggest a slight tendency for rural families to have more hospital admissions than urban families. In addition, these coefficients indicate that families in communities with a low physician-population ratio may use more hospital services and those living in communities with relatively few hospital facilities may use more physician services. These relationships,

while barely significant, suggest a tendency for physicians to treat more patients in the hospital in communities where physicians are in short supply and to treat patients on an out-patient basis where hospital beds are scarce.

Need Component. The inference from Hypothesis III that use of hospital services should be most highly correlated with need while the correlations with dental services should be smallest is only partially supported. Although the correlations for dental use in Tables 7 and 8 are smallest, they are largest for physician use rather than hospital use.[4] Perception of symptoms, seeing a doctor for these symptoms, and having regular examinations are much more closely associated with use of physicians than with utilization of hospitals. Apparently, hospital use is not only largely independent of predisposing and enabling conditions but is also less related to a family's perception of illness and how they respond to illness than might be supposed.

The correlation analysis has provided some evidence about the relative and absolute importance of the predisposing, enabling, and need components in explaining families' use of hospital, physician, and dental services. The correlations also aid us in the selection of variables for subsequent analyses. However, these correlations do not take into account interactions among the explanatory variables nor do they deal explicitly with the dynamic aspect of the model which suggests a three stage sequence leading to use of each type of service. The AID analysis described below deals with these latter problems.

AID ANALYSIS

AID analyses of family use of hospital, physician, and dental services were performed. As for the AID analysis of total use, each was performed in three stages. Predisposing conditions were included in the first stage, enabling conditions in the second, and family need in the third. Also, the variables, family size and age of family head, were reintroduced in the second and third stages to detect additional interaction effects.

The correlations shown in Tables 7 and 8 were used to determine which variables should be included in each analysis. If a significant correlation was found between the explanatory variable and the measure of use in either table, the explanatory variable was included in the AID analysis. Thus, 23 variables were included in the analysis of hospital use since 23

[4] Two coefficients for free care deviate from this pattern: (1) whether or not a family received free care for a major illness was as highly correlated with hospital use as with physician use. The fact that "free care" was coded only if received for a relatively serious illness would logically result in the variable showing a high correlation with hospital services which are provided for serious illness; (2) the correlation between receiving free care and using dental services is negative. Families who receive hospital or physician services at no cost are least likely to have the resources to purchase dental care.

of the 34 variables listed in Tables 7 and 8 showed significant correlations. Twenty-seven variables were used in the analysis of physician use and 32 in the analysis of families' use of dental services.

The dependent variables in both the hospital use and dental use analyses are dichotomies. In each case families using services were divided from those who do not. The measure of physician use is a continuous variable.[5]

Table 9 indicates which of the potential explanatory variables were

[5] Further discussion of these measures is found in Appendix A.

TABLE 9

VARIANCE EXPLAINED IN AID ANALYSES OF HOSPITAL, PHYSICIAN, AND DENTAL USE

VARIABLE	TYPE OF USE		
	Hospital	Physician	Dental
	Proportion of Total Variance in Use Explained		
	Predisposing		
Family size	.02	.15	.03
Age of head	—	.01	.01
Age of youngest member	.08	.01	—
Employment of main earner	—	.01	.08
Race	—	.01	.01
Education of head	—	—	.03
Social class	—	—	.01
	Enabling		
Welfare care	.02	.01	—
Health insurance	.01	.01	—
Regular source of care	—	.04	—
Income	—	—	.02
	Need		
Disability days	.13	.14	—
Free care for major illness	.01	—	—
Seeing a doctor for symptoms	.01	.07	—
Regular physical examinations	—	.02	—
R^2 (Total)	.27[a]	.47[a]	.19

[a] Variables do not equal total because of rounding error.
— Variable not used in AID analysis.

selected by the AID program in the analysis of each type of use. In addition, the proportion of the total variance in use accounted for by the variable is given. For example, the table shows seven variables were used in the analysis of hospital use and that the variable among these explaining the greatest proportion of the total variance was disability days (13 per cent). Further, it shows that family size was used in all three analyses but age of head was employed by the AID program only in the physician and dental analyses. The predictor trees for each of these analyses are found in Appendix B.

The hypothesis suggests that the need component would be of prime importance for understanding hospital use; the predisposing and enabling components would account for the explained variance in dental use; and all three components would explain variance in the physician use analysis. The findings for each component are discussed below.

Predisposing Component. Predisposing conditions were expected to be most helpful in understanding dental use, where families have most choice. Actually, Table 9 shows that the proportion of the variance explained by the predisposing variables is greater for physician use than dental use. Predisposing conditions were expected to, and do, account for less variance in hospital use than in the other types of service.

The subcomponent, family composition, is very important for explaining hospital and physician use and less so for dental use. One aspect of family composition, age of youngest member, accounts for almost all of the explanation of hospital use in the predisposing stage of the analysis. This result indicates the importance of obstetrical admissions in patterns of hospital use since age of youngest child distinguishes families with recent births. Family size is the measure of family composition of most importance for explaining physician use.

In contrast to family composition, social structure variables contribute primarily to the explanation of dental use. Thus, while they explain 13 per cent of the variance in dental use, they account for only 1 per cent of the variance in physician use and none of the variance in hospital use. As was true for the analysis of total use, health beliefs did not enter for any type of use.

These findings suggest that discretion is helpful in understanding the importance of certain types of predisposing conditions but not others. Family composition seems to predispose a family toward certain health services even when discretion involved in use is low. Thus, most families in the early stages of the life cycle have babies and, consequently, use hospital services which are low on the discretionary continuum. However,

social structure appears to be important primarily when discretion is relatively high as was initially hypothesized. For example, receiving prophylactic dental treatment, a highly discretionary type of use, is more likely to be related to the social structure characteristics of the family such as education and race.

Enabling Component. The importance of enabling conditions in explaining use should increase as the discretionary nature of the service increases. However, Table 9 shows that enabling conditions make their greatest contribution to the explanation of physician use followed by hospital use and dental use in that order.

Physician use involves considerable family discretion, and thus the importance of enabling characteristics might be explained in this manner. However, a review of Table 9 shows that regular source of medical care is the most important enabling predictor. Once a family has chosen a doctor, the family loses much of its discretion with respect to subsequent care received. Consequently, enabling conditions, like predisposing conditions, have some influence on use which is not highly discretionary.

Enabling characteristics also account for some variation in hospital use. Table 9 shows that the most important enabling condition is welfare care. Like choice of a physician, use of welfare services may initially be a family decision. But once responsibility has been passed to the formal medical care system, enabling characteristics are related to use of non-discretionary as well as discretionary services. Thus, the medically indigent patient may be admitted to the hospital because the doctor judges the home environment incompatible with treatment objectives. The same condition in a middle class patient might not result in hospitalization because the doctor expects acceptable care to be provided at home.

The relatively small contribution of the enabling conditions for dental use is in part explained by the high correlations between family resources and the social structure variables. Social structure variables such as education, employment of main earner, and social class were used in the first stage of the analysis and explained much of the variance that would have otherwise been explained by family resources such as income in the second stage.[6]

[6] Another way of viewing this process is to consider income as an intervening variable as illustrated below:

(a) Employment of main earner → (b) Income (51) → (c) Dental use (12)

(1 = employed full-time
2 = other)

If the above is correct and the relationships are basically monotonic, the correlation between employment and dental use should be eliminated or greatly reduced when the

Need Component. We expected that need would be most important in explaining hospital and physician use and least important in explaining dental use. Actually, need made a greater contribution to the understanding of physician use than hospital use and contributed nothing to the explanation of dental use as seen in Table 9. The greater contribution to physician use than hospital use is accounted for by the subcomponent, response to illness. While family response to illness is important in explaining physician use, it seems relatively unimportant in determining hospital use. This may reflect the greater discretionary nature of physician services. How families respond to symptoms of illness and how much preventive care they receive has much more to do with physician use than with hospital use. The latter is better predicted by the nature of the illness of the patient and the judgment of the physician.

CONCLUSION

In this chapter hypotheses about families' use of hospitals, physician services, and dental care were examined. These services were studied separately because they are major segments of the total volume of services used. Further, it seemed that family characteristics associated with the use of each would differ.

Hypothesis III was that predisposing and enabling components of the model of use would be most important in explaining dental use, need would be primary in understanding hospital use, and all of the components would account for some variation in physician use. This hypothesis was based on assumptions about the relationships between the explanatory components of the model and the amount of discretion exercised by the patient or his family in using the services: (1) when considerable discretion is exercised, the predisposing and enabling components will be most important; (2) when little discretion is exercised, need will be most important. Discretionary services (dental, preventive physician) are delivered according to the decisions of the patient and his family. Non-discretionary services (hospital, hospital-based physician) are delivered in response to the patient's physical condition and his practitioner's judgment.

Need did account for a larger proportion of the explained variance in hospital use than did the predisposing or enabling components. However, age of youngest family member, which was a predisposing condition, also

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effects of income are partialled out. Using Pearson Product-Moment Correlation Coefficients, we find the following:

$r_{ac} = -.16$ $r_{bc} = .28$ $r_{ab} = -.53$ $r_{ac.b} = -.01$

These correlations do support the explanation above. The correlation between dental use and employment is eliminated when income is partialled out.

made a considerable contribution. These findings indicate that illness in the family, among all the potential influences suggested by the model, is the only effective predictor of family hospital use, with the exception that young families have many obstetrical admissions.

The prediction that all of the components would be important for physician use was only partially supported. While the correlation analysis showed substantial correlations between each component and use, the relative contributions of the enabling component in the AID analysis were small.

The prediction that predisposing and enabling components would make their largest relative contribution in explaining dental use was supported in total by the correlation analysis and in part by the AID analysis. Dental use showed relatively high correlations with predisposing and enabling conditions and low correlations with need. However, in the AID analysis only the predisposing conditions contributed substantially to the explanation of variance in dental use. Enabling conditions made a relatively small contribution similar to that in physician use. The small contributions of the enabling component to the AID analyses of dental use reflect, in part, the intercorrelated effects of predisposing and enabling variables.

The total variance explained in the analysis of physician use was considerably higher than that in either of the others. In addition, the amount of variance explained by each component in the analysis of physician use was higher than in the hospital or dental analyses.

More of the total variance was explained for hospital use than dental use. This occurred primarily because of the unexpected contributions of the predisposing conditions to the analysis of hospital use. These results indicate that predisposing variables are important predictors of some services which are *not* highly discretionary such as hospital obstetrical care.

CHAPTER VI

IMPLICATIONS

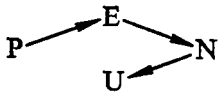
This chapter discusses implications of the findings for: (1) modifying the model; (2) reducing the unexplained variance in use of health services; and (3) formulating social policy.

MODIFYING THE MODEL

The model for describing and predicting the use of health services employed in this study was based on the assumption that certain relationships existed among the predisposing, enabling, and need components. A further assumption was that the importance of the components would vary according to the discretionary nature of the health service. The findings suggest modifications in both of these basic assumptions.

The Relationships of the Components

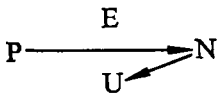
The original model described a simple sequence of necessary components leading to health service use. These components, in the order of their occurrence, were predisposing (P), enabling (E), and need (N). The sequence can be diagrammed as follows:



The model was helpful in thinking about the difference in the way families used health services. However, the investigations of various types of use suggest that there are some differences in the relationships of the components for different types of services which should be considered in models for future studies.

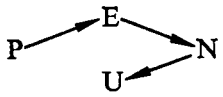
Hospital Use. The analysis of hospital use showed that need was the primary determinant of family use. The predisposing and enabling conditions were relatively unimportant with one major exception: young families in the reproducing stage of the family life cycle were predisposed to have more hospital admissions because of hospitalized obstetrical care. Conse-

quently, the following diagram might more accurately represent hospital use:



Here, the main influence accounting for family differences in use (U) is shown to be need (N), which is related in part to the predisposing influence of family composition (P). The absence of arrows to and from the enabling conditions (E) indicates the relatively minor importance of this influence.

Physician Use. The model for physician use appears to correspond to the general model. While need again proved to be most important, the predisposing and enabling conditions also contributed to the explanation of family differences. Consequently, the diagram is the same:



Dental Use. The results for dental use show that need, as measured in this study, is relatively unimportant. Instead, many of the predisposing and enabling variables showed relationships with dental use which were stronger than relationships with any other type of use. Consequently, the following diagram more accurately portrays dental use:

The Components and Discretion

As predicted, predisposing and enabling components were most useful in explaining differences in the use of discretionary services. However, there were instances when predisposing conditions played a fairly important role in explaining use of hospital services which involved little discretion. In addition, enabling conditions also entered into the explanation of hospital use.

The predisposing conditions which explain use of non-discretionary type services seem to be largely family composition variables. Close ties between family life cycle stage and illness in the family may account for this. Thus, while the other predisposing subcomponents (social structure

and health beliefs) are mainly associated with discretionary use, family composition tends to be associated with both discretionary and non-discretionary services.

The relationship of enabling characteristics to non-discretionary services (hospital use) probably depends, in part, on their distribution in the population. If there is great heterogeneity in the distribution of an enabling condition, they might explain differences in use not only of discretionary services but also of non-discretionary services. For instance, accident victims in a rural community may not receive emergency treatment because there are no physicians in the area.

Thus, there are at least two exceptions to the general rule that the predisposing and enabling components will not be effective in explaining use of non-discretionary services. First, family composition is related to use of non-discretionary as well as discretionary services. Second, the relationship of enabling variables to non-discretionary services will depend in part on the distribution of the enabling characteristics in the population.

REDUCING THE UNEXPLAINED VARIANCE

Considerable variance in family use of health services was not accounted for in this study. Possible reasons for this unexplained variance and methods to reduce it are suggested below.

Method

The unit of observation for this study was the family. While there is certainly homogeneity with respect to both dependent and independent variables among members of the same family, there is also considerable heterogeneity. When a single measure is used to represent all family members, this heterogeneity is pooled and facility for explaining variance may be reduced.[1]

Differences in use might be better understood if results of the AID analysis were used as a basis for a conventional multiple regression approach. Sonquist and Morgan suggest that variable relationships specified by AID can be employed to transform the predictors and dependent variables into a form suitable for subsequent regression analysis.[2]

[1] An alternative approach would be to use the individual as the unit of analysis while retaining family characteristics. This approach would mitigate the effects of pooling heterogeneous observations and at the same time provide some information regarding the effect of the family on the individual. A danger is that important family influences are more easily overlooked when the emphasis is on the individual.

[2] One potential advantage of such an approach is that continuous independent variables, which must be transformed into discrete form with a limited number of categories for the AID analysis, can be used in their continuous form in the regression analysis. However, Sonquist and Morgan question whether this difference substantially adds to the explanatory ability of most variables (1964, pp. 99–104).

Dependent Variables

The form of the dependent variables may also affect the variance explained.[3] For instance, combining dissimilar measures impedes satisfactory explanation. Thus, if in-hospital physician care were to be separated from out-patient physician services, it is conceivable that the ability to explain use of both these services might exceed that for all physician services combined. Using dichotomies as dependent variables may also result in a relatively small proportion of total variance being explained (R^2). If families with low dental use are more like those who use no dental services than like high users, an analysis of users only may result in a higher R^2 than did the analysis in this study.

Independent Variables

Even though the need variables were generally the most powerful of all predictors, they still accounted for less of the variance than they might with more precise measurement. It seems likely, for example, that a clinical evaluation in addition to the family report would increase the variance explained. Also, measures of need are probably not sufficient for the dental use analysis. "Need" as measured in this study relates primarily to traditional medical services. Measures of need more directly related to dental use might account for some proportion of the unexplained variance.

Alternative or additional measures of other components might also reduce unexplained differences.[4] Possibilities include: (1) a measure of status consistency as a variable for social structure;[5] (2) the response of the wife rather than the head of the family to represent family health be-

[3] Preliminary analyses showed that a greater proportion of the variance in total use was explained when a log transformation was used than when the untransformed measure was used. The log transformation, in effect, reduced the proportion of the total variance accounted for by high use families. Since it is exceptionally difficult to explain use patterns of such families, the overall predictive ability of the analysis was increased. Other transformations might further increase the explanation for some analyses. However, such transformations seem appropriate only when a sound rationale is provided for making them.

[4] Some influences are especially difficult to measure in a nationwide study. For example, the measures of health beliefs and ethnicity used in this study showed little relation to overall use patterns. Yet, there is considerable evidence that particular ethnic groups are quite distinctive in their attitudes toward, perceptions of, and reactions to illness.

[5] Jackson found that degree of status consistency was inversely related to psychological stress using as an indicator of stress the number and severity of psychophysiological symptoms experienced by an individual. People with a low achieved status (education, occupation) and high ascribed status (race, ethnicity) tended to report more symptoms (1962, pp. 475–476). These findings suggest that families with low achieved status and high ascribed status may also perceive need for health services, and, consequently, use more.

liefs;[6] (3) improved measures of family resources including measures of permanent income,[7] type of health insurance,[8] and more detailed characteristics of regular doctors;[9] (4) more specific measures of the community in which the family lives;[10] and (5) a price of health services measure to represent community resources.[11]

SOCIAL POLICY[12]

The distribution of health services is receiving increasing attention from the government, medical care administrators, researchers, and the general public. The basic questions asked are (1) how are services divided among various types of people in the population? and (2) how should they be divided?[13]

There is growing concern that medical care is not "equitably" distributed either in terms of quality or quantity.[14] Some families receive considerably less care than is warranted given the general affluence of our society and the potential of the health service system to provide services.[15] In addition, the services these families do receive tend to be below the

[6] Blood and Wolfe's study, for instance, indicates that the mother is mostly likely to make final decisions regarding illness and medical care for the family (1960, p. 21).

[7] Family use of many goods and services is not generally raised or lowered to correspond with temporary changes in income. Rather, a family's level of consumption is determined primarily by its expected normal or permanent income (Friedman, 1951). Several authors have applied this concept to analyses of health service expenditures with varying success. See Feldstein and Carr (1964); Wirick and Barlow (1964); and Feldstein, P. (1964).

[8] The nature of coverage (prepaid group practice vs. indemnification and group vs. non-group) also influences use patterns. See, for example, Anderson (1957); Lowry (1957); Anderson and Sheatsley (1959); Densen and Jones (1960); Williams *et al.* (1962); Blue Cross Association (1963); Weinerman (1964); and Rodman (1965).

[9] While the regular physician is the "gate keeper" regulating family use patterns, the only measure of physician characteristics included in the analysis was "regular source of care." Possibly, additional physician characteristics such as age, specialty, and site of practice would improve the results.

[10] For instance, the category "large urban" might be further divided into "inner city" and "commuting suburb."

[11] According to economic theory we might expect families living in areas with relatively lower prices per unit of service to use more services than families in areas with higher prices. See Rosenthal (1964, p. 29), and Feldstein, P. (1964, p. 60).

[12] This section is generally addressed to persons interested in relating theoretical concepts and empirical findings to applied problems. In particular, it is intended for those concerned with the application of social science to the problems of health services administration.

[13] For a discussion of distribution of health services ands ocial policy, see Titmuss (1965).

[14] Strauss (1967).

[15] Muller (1965).

standards for the rest of the population.[16] Demands for change are based on the ethic that all persons have a right to medical care of reasonably high standards regardless of their means.[17]

While this study does not bear directly on quality of care, it does relate to the distribution of services. The model from the study will be used to describe what the effects of an "ideal type" system of equitable distribution of health services might be.[18] The thesis is that the effects on use would be maximized for some components of the model and minimized for others. Actual effects of these components under the current system of distribution, as determined by the empirical analysis, will then be compared with the effects expected under an ideal type system of equal distribution. Ways will be discussed to make sources of actual variations in health service use approximate the ideal type.

Effects of Components under a System of Equitable Distribution

Equitable distribution of health services does not mean that all families receive the same amount of health services regardless of the family characteristics. Table 10 shows which components of the model have maximum influence on use and which have minimum influence, given our concept of equitable distribution. The table does not imply that the effects minimized are eliminated entirely.[19] Rather it suggests that the relative importance of certain components is considerably less than others.

Among the seven subcomponents, only the effects of two, family composition and illness, are clearly maximized. A third, response to illness, has mixed effects. Some of these are maximized and others minimized. The remaining four subcomponents, social structure, health beliefs, family resources, and community resources, have minimum influence on the distribution of health services.

Equitable distribution, then, means that family characteristics such as age and sex structure, size, and amount of illness in the family largely determine the amount of health services the family uses. Characteristics such as social class, race, and income have less impact. A more detailed consideration of each subcomponent follows.

[16] Yerby (1966).

[17] For a general review of the problem see "Medical Care for Low Income Families" (1968). This issue of *Inquiry* is devoted to papers presented at a symposium sponsored by Center for Health Administration Studies, University of Chicago.

[18] "Ideal type" as conceived by Max Weber is a mental construct. It is formed by accentuation of one or more traits observable in reality. It is a tool for analysis of concrete situations, a limiting concept with which life situations or actions are compared in the process of investigation. See Parsons (1947, p. 99).

[19] Fuchs suggests that removal of all variation in use other than that based on some "objective need criteria" is not only impossible but also probably undesirable (1967).

Family Composition. Family composition is an important basis for distributing health services under a system of equitable distribution because of the well established relationships of family life cycle stage to physical need, disease patterns, health maintenance, and, subsequently, use of health services. Based on the requirements of individual family members, it seems almost a given that families in the reproductive stages should use more services than families immediately preceding or following that stage; that aging families prone toward chronic disease should use more services than younger families; and that large families should use more services than smaller ones.[20]

TABLE 10

EFFECTS OF MODEL COMPONENTS IN A SYSTEM OF EQUITABLE DISTRIBUTION OF HEALTH SERVICES

Component	Subcomponent	Effect
Predisposing	Family composition	Maximized
	Social structure	Minimized
	Health beliefs	Minimized
Enabling	Family resources	Minimized
	Community resources	Minimized
Need	Illness	Maximized
	Response	Maximized-Minimized

Social Structure. The influence of social structure is minimized because it is, in large part, independent of need. These factors influence use directly or through enabling characteristics. When they are related to need, the ultimate effect on use is usually not desired. The lower class life style is more likely to include an environment which creates added health problems and more illness. Yet these same families tend to use fewer, rather than more, services compared to the rest of the population.

Health Beliefs. In general, beliefs conducive to good health are expected to result in greater and more effective use of health services. Consequently, the variance accounted for by beliefs tends to represent differences between families which are reduced under a system of equitable distribution.

Family Resources. The effects of family resources such as income, insurance, and regular care are minimized. Lack of these resources repre-

[20] While most of the variance accounted for in this study by family composition variables is of the type described in the text, there are actually some effects of family composition which are minimized under a system of equitable distribution. One of these is the structural effect of family size which seems to result in less care per family member as family size increases.

sents barriers to medical care. Low income, no insurance, lack of eligibility for welfare services, and no regular source of care result in low use levels. Barriers to use cause differences between families which a policy designed to spread health services seeks to remove.

Community Resources. Community resources also differentiate families for reasons which are not compatible with the concept of equitable distribution. For example, the rural family may use fewer services than its urban counterpart because of hardship or inconvenience in getting to a doctor.

Illness. Variation explained by illness is maximized. In fact, the ideal type is based on the importance of illness in determining distribution of services. Of course, the measures used in the study are perceptions on the part of the family. However, the concept includes both perception and clinical illness.

Response. Equalization would reduce some family use differences explained by response to illness and increase others. For instance, it is generally considered desirable for everyone to have periodic examinations. If this were the general practice, it would reduce variation in use from family to family. However, certain family members, depending on age and sex, need to have more frequent checkups. This results in greater variation from family to family.

Actual Effects of Components

The discussion above has suggested which effects in the model of family use would be maximized and which would be minimized in a system which provides equitable distribution of services. In this section we will compare actual sources of variation with this ideal type. It is certainly beyond the scope of this monograph to present integrated plans to make the actual more like the ideal. However, some current and proposed methods of equalizing distributions will be discussed in light of the findings.

A value judgment underlying a policy of equalizing health service distribution is that "too much" of the variance in use is currently accounted for by influences other than family composition and illness. While it is very difficult to define what proportion is "too much," family composition and illness *did* account for a large percentage of the explained variance. Thus, in analysis of all services combined, the two subcomponents accounted for 70 per cent of the explained variance. The proportions were 85 per cent for hospital use and 66 per cent for physician use. Only for dental use was the proportion of total explained variance accounted for by family composition and illness less than half (21 per cent).

Most of this discussion will consider ways for reducing the influence of

certain components on family use. However, it should be remembered that reducing the influence of some components will at the same time serve to increase the relative influence of others. Thus, if all of the influences in Table 10 which should be reduced to equilize distribution were in fact reduced, family composition and illness would explain a much larger portion of the variance as a result.

Social Structure. Social structure accounts for a considerable proportion of the variance of dental use, a smaller proportion of physician use, and practically none of hospital use. Basic alterations in employment status or educational level might alter dental and physician use patterns in the long run. Such changes do not seem generally appropriate with respect to the more immediate health needs of the population. However, it may not always be necessary to change educational or social class levels directly to affect changes in use patterns. Evidence indicates that much of the influence of social structure is through intervening enabling characteristics. For example, much of the effect of education on dental use can also be explained by income. Consequently, when such a relationship is discovered, some change in use patterns might be expected by a change in income distribution.

Health Beliefs. Health beliefs explained little variance for any type of use. Different measures and techniques might improve their predictive power. However, the findings certainly call into question the effectiveness of health educational campaigns for changing health or illness behavior.

Family Resources. Family resources have less influence on use than family composition or need. However, these enabling conditions still have considerable effect on physician use and dental use and a smaller influence on hospital use.

Regular source of care is an important family resource for physician use. Amount of use tends to be lower for families with no source of care than for families with a highly specialized source. While levels of illness may account for some of this difference,[21] this finding still indicates the importance of an established entry into the health care system. Families who feel they have a regular place to go for health services and who are familiar with the procedure use more services.

Some families who have mastered the welfare system may go on to use considerable amounts of services. However, there is evidence that many low income families have not mastered the system. They are not financially

[21] Sick people may tend to gravitate toward more specialized sources of care.

able to use the private system and, in addition, are not predisposed to do so. Merely providing a means to finance medical care for these families may not prove sufficient.

Providing these families with a particular point of entry to health services may be necessary. In some instances, even a more directed program with the creation of a special sub-system tailored to the needs of these families is probably called for. Special funds are now being provided for the purpose of setting up such programs.[22] These programs also provide one method for reducing variance in use caused by response to illness. Patients can be actively sought out for treatment. Such procedures for traditionally low use populations would tend to minimize the effects of differential responses.

The effects of other family resources suggest additional changes that might reduce undesired variance in health service use. The strong influence of income on dental care indicates that financial subsidy not associated in any direct manner with health services might in some instances alter health service use patterns. For example, a guaranteed annual income might increase use of health services for some low-income segments of the population.

Health insurance coverage explained differences in physician and hospital use. Increasing coverage and benefit levels appear to increase use. Medicare follows the plan of voluntary health insurance. While it was intended to relieve financial hardship for older people, it has also encouraged use of services. Even though the increase is not as great as some predictions, the proportion of total hospital services provided to older persons has increased since the passage of Medicare.[23] Insured low-income persons have traditionally been high users.[24] Thus, despite the apparent inability of some low-income persons to use the system, the traditional health insurance approach still tends to equalize service distribution.

Medicaid provides direct payment to providers of medical care by the government for families below a certain income level.[25] Recipients are expected, as in the case of Medicare, to procure services directly from the

[22] The Office of Economic Opportunity has encouraged communities throughout the country to examine their present patterns of providing health care to their indigent populations and to evaluate these in relationship to the community as a whole. For a description of one such program in Chicago, see Presbyterian–St. Luke's Hospital (1966), and American Public Health Association (1967). See also, Goodrich (1965) and Health Insurance Plan of Greater New York (1965).

[23] Ament and Luttman (1967).

[24] Anderson and Feldman (1956, pp. 59, 65).

[25] Public Law 89-97, Title 19, provides for the full range of medical services to be provided to families below income levels determined by the respective states. The program is financed by matching federal and state funds.

providers of care. As a means of altering the distribution of services, this approach is useful if financial barriers are the main hindrance to use; it is less effective if other components such as social structure are involved.

Community Resources. Changes in use patterns are sometimes attempted by redistribution of facilities and personnel. This is the approach of the Hill-Burton program. Federal funds are granted for hospital building programs where hospital bed-population ratios are low. The program has particularly benefited rural areas.[26] However, none of the community enabling variables used in this study predicted volume of use. Consequently, further alteration of facility distribution does not appear to be a very effective way to influence family use patterns. Rather, there is already considerable flexibility within a local system in supplying services for a community.

In sum, this study shows that much of the variation in family use of health services is explained by effects that are maximized under a system of equitable distribution. However, other effects that are minimized under a system of equitable distribution still play an important part in the present system in this country.

The above discussion suggests the complexity of the problem. There is probably no single "best" method for redistributing health services. Rather, some combinations of approaches, each structured to meet the varying needs of particular segments of the population, may be most appropriate. In general, change can probably be more easily instigated where family resources have considerable influence than where differences result from a more basic and inflexible social structure.

[26] Division of Hospital and Medical Facilities (1966).

APPENDIXES

APPENDIX A

ANALYSIS TECHNIQUES

The correlation and AID techniques used in this study were described in general terms in the text. The purpose of this Appendix is to provide details necessary for a more thorough evaluation of these procedures.

CORRELATION ANALYSIS

The correlations show which components of the model are most closely associated with use of health services. They also are used as screening devices to determine which variables should be used in subsequent AID analyses. "TAU" and "PHI" correlation coefficients were used.

TAU reveals the strength and direction of relationships which are monotonic (i.e., do not change direction).[1] The magnitude of TAU varies from -1 to $+1$. It is suitable as a measure of correlation if at least ordinal or rank order measurement of both variables has been achieved.

TAU correlations alone are not sufficient to show all important relationships because not all variables are ordinal nor are all the relationships between ordinal variables and use monotonic. Some of the variables used in the analysis are of the nominal variety. Examples are marital status, region, and residence, which do not provide rank ordering but simply indicate differences.

An example of an ordinal variable related to health service use which cannot be described through simple monotonic correlation is age of family head. Families in the initial stages of the family life cycle use fewer health services. As children are born, use increases, only to decrease again as they grow older and leave home. Another period of increased use begins as the parents age and become increasingly subject to chronic disease.

Some indication of non-monotonic relationships is provided by the PHI

[1] Kendall (1955, pp. 1–48). TAU B was used for contingency tables having an equal number of rows and columns. TAU C was used for tables having an unequal number of rows and columns.

correlation coefficient.[2] PHI is not as sensitive as TAU to the monotonic correlations of ordinal measures, and it does not indicate directions of relationships. It does, however, assess the strength of relationships involving classificatory variables such as region. In addition, when used in conjunction with TAU, it can indicate the presence of complex associations such as those described between age of head and use of health services.

PHI is essentially the well known Chi square measure of significance, adjusted for the number of observations. In a two-by-two table the PHI coefficient varies from 0 to 1. However, it has no upper limits when there are more than two rows or columns.

Table 5 in Chapter IV provides examples of the methodological uses of the correlations. It shows the TAU and PHI correlation coefficients resulting from cross tabulation of total use with each independent variable. The categories for each variable are defined in Appendix B where the marginal count for each category is given. Only correlation coefficients significant at .01 level are listed.[3] An asterisk (*) shows that the correlation is not significant. A dash (–) indicates that computation of the TAU coefficient was not appropriate. For example, no TAU correlation is listed between use and region because the latter is nominal or classificatory rather than ordinal.

Some illustrations from Table 5 point out different types of relationships described by TAU and PHI and how the two measures can be used concurrently to increase overall understanding of family use patterns. The TAU correlation between age of family head and total amount of health services used is barely significant, showing a small monotonic relation between the two variables. Also, the sign of the coefficient is negative, indicating that as age of the head of the household increases, total use decreases. However, prior evidence has suggested that the overall relationship may be stronger than that indicated by TAU. Further, to conclude that use decreases as age of head increases is a gross oversimplification. Given the small TAU coefficient, the large PHI coefficient indicates a more complex relationship. In addition, it indicates greater overall association which is not monotonic.

As another indication of how the two correlation coefficients can be combined to provide additional information, consider the coefficients for health beliefs in Table 5. TAU generally shows small but still significant

[2] Blalock (1961, pp. 225–230).

[3] The test of significance used for TAU is found in Siegel (1956, pp. 220–222). Chi square was the test of significance for PHI. Chi square was computed using criteria similar to those proposed by Cochran, (1954, pp. 417–451). If more than 20 per cent of the expected cell frequencies were less than five, the "exact mean and variable technique" was used. For other tables the regular Chi square statistic was computed.

relationships, indicating that use increases as attitudes toward physicians and health services become more positive and knowledge of disease increases. Conversely, fewer PHI correlations are significant. Since PHI is less sensitive to monotonic relationships, it might be inferred that the correlations between use and beliefs represent largely monotonic associations.

AID ANALYSIS

Taking use of health services as the dependent variable, the analysis employs a nonsymmetrical branching process based on variance analysis techniques to subdivide the sample into a series of sub-groups which maximize one's ability to predict values of the dependent variable. Linearity and additivity assumptions inherent in conventional multiple regression techniques are not required.

The program was developed for social survey analyses in which measures for a set of predictors and a dependent variable have been obtained. The predictors can either be classificatory variables or more precise scales of measurement. The dependent variable can be continuous, an equal interval scale, or a dichotomy. Included in the discussion below are a description of the program algorithm, rules used to stop the computer analysis, and discussions of forms of the dependent and independent variables used in the AID analyses. The last section presents charts showing predictor trees for the AID analyses of hospital, physician, and dental use.

Description of the Algorithm[4]

1. The total input sample is considered the first (and indeed only) group at the start.

2. Select that unsplit sample group, group i, which has the largest total sum of squares.

$$TSS_i = \sum_{a=1}^{N_i} Y^2 - \left(\sum_{a=1}^{N_i} Ya\right)^2 \Big/ N_i \qquad (1)$$

such that for the i'th group

$$TSS_i \geq R\ (TSS_T) \quad \text{and} \quad N_i \geq M \qquad (2)$$

where R is an arbitrary parameter (normally $.01 \leq R \leq .10$) and M is an arbitrary integer (normally $20 \leq S \leq 40$).

Requirement (2) is made to prevent groups with little variation in them, or small numbers of observations, or both, from being split. That group with the largest total sum of squares (around its own mean) is selected, provided that this quantity is larger than a specified fraction of the original total sum of squares (around the grand mean), and that this group contains more than some minimum

[4] With minor changes the first five points are quoted directly from Sonquist and Morgan (1964, pp. 5–6).

number of cases (so that any further splits will be credible and have some sampling stability as well as reducing the error variance in the sample).

3. Find the division of the C_k classes of any single predictor X_k such that combining classes to form the partition p of this group i into two non-overlapping subgroups on this basis provides the largest reduction in the unexplained sum of squares.

Thus, choose a partition so as to maximize the expression:

$$(n_1\bar{y}_1^2 + n_2\bar{y}_2^2) - N_i\bar{Y}_i^2 = BSS_{ikp} \tag{3}$$

where

$$N_i = n_1 + n_2$$

and

$$\bar{Y}_i = \frac{n_1\bar{y}_1 + n_2\bar{y}_2}{N_i}$$

for group i over all possible binary splits on all predictors, with restrictions that: (a) the classes of each predictor are ordered into *descending sequence*, using their means as a key; and (b) observations belonging to classes which are not contiguous (after sorting) are not placed together in one of the new groups to be formed. Restriction (a) may be removed, by option, for any predictor X_k.

4. For a partition p on variable k over group i to take place after the completion of step 3, it is required that:

$$BSS_{ikp} \geq Q(TSS_T) \tag{4}$$

where Q is an arbitrary parameter in the range $.001 \leq Q < R$, and TSS_T is the total sum of squares for the input sample. Otherwise group i is not capable of being split; that is, no variable is "useful" in reducing the predictive error in this group. The next most promising group (TSS_j = maximum) is selected via step 2, and step 3 is then applied to it, etc.

5. If there are no more unsplit groups such that requirement (2) is met, or if, for those groups meeting it, requirement (4) is not met (i.e., there is no "useful" predictor), or if the number of currently unsplit groups exceeds a specified input parameter, the process terminates.

6. Residuals, discrepancies between observed and predicted values of y, may be punched or written on tape, or both, for subsequent analysis. The predicted value of y is the mean of the final group of which the observation is a member. The residual may be designated as the new y (dependent variable) and steps 1–5 repeated.

Rules for Stopping

The primary test is one of importance, i.e., the reduction in the error sums of squares. This is kept from being too arbitrary by expressing it as a per cent of the original total sums of squares. This is equivalent to saying that if there is a great deal of variation, the two new groups must be more disparate than if there is less variation. The use of error reduction also handles the problems

of different numbers of observations in the two new groups, since the greater the disparity between group sizes (N's), the larger the difference between the means has to be to produce the same between-group sums of squares.[5]

However, there is also the problem of the "number of things tried" which is relevant to the problem of fortuitous splits.[6] The probability of this happening is proportional to the number of possible splits at each step, since if we had enough classes available in the predictors, and a sufficient number of predictors, we should be able to reduce the unexplained variation by half with each split. Thus a term such as:

$$K = \sum_{i=1}^{NP} (c_i - 1)$$

which is the total number of classes for each predictor (minus one), summed over all predictors, should also be taken into consideration.

Sonquist and Morgan suggest that with K less than 100 and samples of 2000–3000 and with a dependent variable that is not too badly skewed, the resulting *trees* seem manageable and interpretable with a requirement for error reduction of .005. With more predictors or smaller samples, the criterion should be raised.[7] The sample size for this analysis is 2367 families and no K exceeds 70. A split reducibility criterion of .006 was adopted.

In addition to the split reducibility criterion, minimum group size is an important criteria for stopping the process. "For typical survey data a minimum group size of 25 seems reasonable, since one hardly ever puts much credence in two subgroups whose combined N's add to 25 or less."[8] Consequently, no group i with $N_i < 25$ was split.[9]

Forms of the Dependent Variables

The dependent variables are all measures of family use of health services. The nature of these units is discussed in Chapter III and Appendix B. The measures of use were constructed to generally meet the requirements for a continuous scale. Separate analyses using AID were planned for total use (a summation of the use of different types of services), physician use, inpatient hospital use, and dental use. Due to the distribution of each of these basic measures of use, transformations have been made in each case.

[5] *Ibid.* (1964, p. 114).

[6] *Ibid.* (1964, p. 116).

[7] *Ibid.* (1964, p. 119).

[8] *Ibid.*

[9] Sonquist and Morgan argue that, "It seems unreasonable to apply ordinary statistical tests at each split." For consideration of possible tests of significance, see Sonquist and Morgan (1964, pp. 114–119).

In a preliminary analysis, the measure of total use was found to be highly skewed in a positive direction.[10] Thus, 68 families with 2000 units or more of use accounted for over two-thirds of the total sums of squares. Generally the program will find some predictor which enables it to split out these extreme cases from the group in which they happen to be. These splits are often fortuitous, and the resulting terminal groups will have large positive means and will contain few (1–5) observations. When the extreme cases are not split out, the explained variance appears very low because the high use families account for so much of the total variance.

Strategies which can be used to reduce the problems caused by a highly skewed dependent variable include removing the extreme cases and rerunning the analysis without them or transforming the dependent variable into a somewhat more normally distributed form, perhaps using logarithms.[11] The second strategy was adopted in this analysis.[12]

The dependent variable in the analysis of the summary measure of all health services used was a transformation using logs to the base 10. The measures of physician use also showed high positive skewness. Subsequently it was also transformed by use of logs for purposes of the analysis. The effects of these transformations with respect to skewness and also kurtosis are shown in Table A-1. These data indicate that the transformations did result in considerably more normally distributed measures.

Seventy-two per cent of the sample families did not use inpatient hospital services, and 42 per cent did not use dental services during 1963. Thus, even though continuous scales for these measures were available, dummy variables seemed more appropriate in view of the large number of nonusers—especially for inpatient hospital care. For these analyses: 2 = use; 1 = no use.

Total use and types of use were divided into discrete categories to run contingency tables and compute PHI and TAU correlation coefficients.[13] Thus, the forms of the dependent variables used for the correlation coefficients and those used in the AID analyses differ. Strength and directions of relationships found in the two types of analyses may vary somewhat due to these altered forms. However, because of the large sample size and the use of two correlation coefficients, there seems to be little chance that a predictor which would have made a non-fortuitous split in the sample was not in-

[10] Andersen and Anderson (1965, p. 19).

[11] Sonquist and Morgan (1964, p. 120).

[12] The first strategy is discussed and attempted in Andersen and Anderson (1965, p. 18).

[13] The number of categories for each type are: total—7, hospital—4, physician—7, and dental—5.

cluded in the AID analysis because of these changes in forms of the dependent variable.

Each predictor in the AID analysis is designated as "M" (monotonic) or "F" (free).[14] Predictors identified as type M have the order of their coded values (0, 1, . . . , K, . . . , 62, 63) maintained during the partition scan. In designating a predictor, say U_p, M, it is assumed that the function $y = \bar{y}_{kp}$ is monotonic. The usual use for a type M restriction is to apply it to an ordinal scale or to class-interval codes established for a continuous variable with an expected monotonic effect on the dependent variable.

Predictors identified as type F have their classes rearranged during the partition scan. They are sorted into descending sequence using the mean value of y for each class as a key. The usual use for a type F predictor

TABLE A-1

SKEWNESS AND KURTOSIS OF THE ORIGINAL AND TRANSFORMED MEASURES OF TOTAL USE AND PHYSICIAN USE

TYPE OF USE	SKEWNESS[a]		KURTOSIS[a]	
	Original	Log Transformation	Original	Log Transformation
Total.....	44.8	−0.6	5.3	0.6
Physician.....	2.9	−0.5	12.8	−0.4

[a] 0.0 is the magnitude for a normal curve. See Snedecor (1956, pp. 199–262).

classification is for variables that are nominal scales or for other cases in which it is suspected that the function $y = \bar{y}_{kp}$, where k is the predictor class code, is not monotonically increasing or decreasing.

The designation of the predictor "M" or "F" in this study was made after examination of the contingency tables and the PHI and TAU correlation coefficients for each predictor and dependent variable. Table A-2 gives the designation of each predictor for each use analysis.

Number of classes in the predictors contributes to the probability of a fortuitous split occurring. Also, whether or not any given predictor has its ordering constrained (is assumed to be monotonic) will affect the probability of its being involved in a fortuitous split. Sonquist and Morgan suggest a two part rule for minimizing the effects of a large number of classes and the increasing probability of a fortuitous split when a predictor is unconstrained.

[14] The maximum number of predictors allowed by the AID program is 63.

a. Predictors which have a natural rank ordering to their classifications should be constrained to that ordering during the partitioning process, except where the possibility of a U-shaped or inverted U-shaped relationship between that variable and the dependent variable is suspected, in which case adjoining classes should be combined to form a maximum of *five* classes and the variable left unconstrained.

b. Un-ordered predictors should not have more than five or six classes and should be left unconstrained.[15]

The number of classes of predictors for the AID analyses was determined by using the above rule. The exact variable and the nature and number of its classes can be determined by using Table A-3. The number of the variable given there refers to Appendix B where a description of the variable can be found.

The forms of the variables for the AID analyses are basically the same as for the correlation analyses. They differ in the way "No Answers" (NA's) were handled.

NA's were generally excluded from the contingency tables and, thus, were not considered in calculating the correlation coefficients. However, in the AID analysis NA's were usually combined with another category. This was particularly true for variables designated "M," for there are no criteria for placing the NA's in a separate category somewhere along the continuum. The only alternative to combining the NA's with another category was to exclude them from the entire analysis. This possibility was rejected because of the large case loss resulting from the rejection of every family coded "NA" on any of the predictors. The procedure used to combine the NA's with another category for the AID analysis was to compare the distribution of blanks over each dependent variable with the distribution of each other class of the predictor over the dependent variable. The blanks were then assigned to that class which had the most comparable distribution.

Predictor Trees for the Hospital, Physician, and Dental Analyses

The trees for these analyses correspond to the tree shown in Figure 1 for the total use analysis. They show the exact splits which accounted for variance in each analysis and indicate where interaction effects may be present. Further, they allow detailed comparisons of predictors important for each type of use.

[15] Sonquist and Morgan (1964, p. 121).

TABLE A-2

TYPE OF VARIABLE IN AID ANALYSIS FOR EACH TYPE OF USE

PREDICTOR	TYPE OF USE			
	Hospital	Physician	Dental	Total
	Type of Predictor[a]			
Predisposing				
Family size	M	M	F	M
Sex of head	F	F	F	F
Marital status of head	F	F	F	F
Age of head	F	F	F	F
Age of oldest member	F	F	F	F
Age of youngest member	F	M	F	F
Employment of main earner	F	F	F	F
Social class of main earner	—	M	M	M
Occupation of main earner	F	F	F	F
Education of head	—	M	M	F
Ethnicity	—	—	M	M
Race	F	F	F	F
Value of health services	—	M	M	M
Value of physicians	—	—	—	—
Value of good health	—	—	M	—
Value of health insurance	—	—	F	F
Attitude toward health services	—	M	M	M
Attitude toward physician use	—	M	—	M
Knowledge of disease	—	M	M	—
Enabling				
Income	F	M	M	F
Savings	F	M	M	—
Health insurance	F	F	F	F
Regular source of care	F	M	M	F
Welfare care	F	F	F	F
Physician ratio	M	—	M	—
Hospital bed ratio	—	F	M	—
Residence	F	—	M	—
Region	F	—	F	—
Need				
Symptoms	M	M	F	M
Disability days	M	M	F	M
Health level	M	M	F	M
Free care for major illness	F	F	F	F
Seeing doctor for symptoms	F	F	F	F
Regular physical examinations	M	M	F	M

[a] M = monotonic; F = free; — = predictor not included in AID Analysis.

TABLE A-3

IDENTIFICATION OF POTENTIAL PREDICTORS IN AID ANALYSIS FOR EACH TYPE OF USE

PREDICTOR	TYPE OF USE			
	Hospital	Physician	Dental	Total
	Identification Number of Predictor[a]			
Predisposing				
Family size	15	15	16	15
Sex of head	17	17	17	17
Marital status of head	18	18	18	18
Age of head	20	20	20	20
Age of oldest member	22	22	22	22
Age of youngest member	25	24	25	25
Employment of main earner	27	27	27	27
Social class of main earner	—	29	29	29
Occupation of main earner	31	31	31	31
Education of head	—	34	34	33
Ethnicity	—	—	35	35
Race	37	37	37	37
Value of health services	—	39	39	39
Value of physicians	—	—	—	—
Value of good health	—	—	42	—
Value of health insurance	—	—	44	44
Attitude toward health services	—	46	46	46
Attitude toward physician use	—	48	—	48
Knowledge of disease	—	50	50	—
Enabling				
Income	51	51	51	51
Savings	53	53	53	—
Health insurance	54	54	54	54
Regular source of care	55	55	55	55
Welfare care	56	56	56	56
Physician ratio	57	—	57	—
Hospital bed ratio	—	58	58	—
Residence	59	—	59	—
Region	61	—	61	—
Need				
Symptoms	62	62	62	62
Disability days	63	63	64	63
Health level	65	65	65	65
Free care for major illness	66	66	66	66
Seeing doctor for symptoms	68	68	68	68
Regular physical examinations	69	69	69	69

[a] Refers to number of variable in Appendix B.

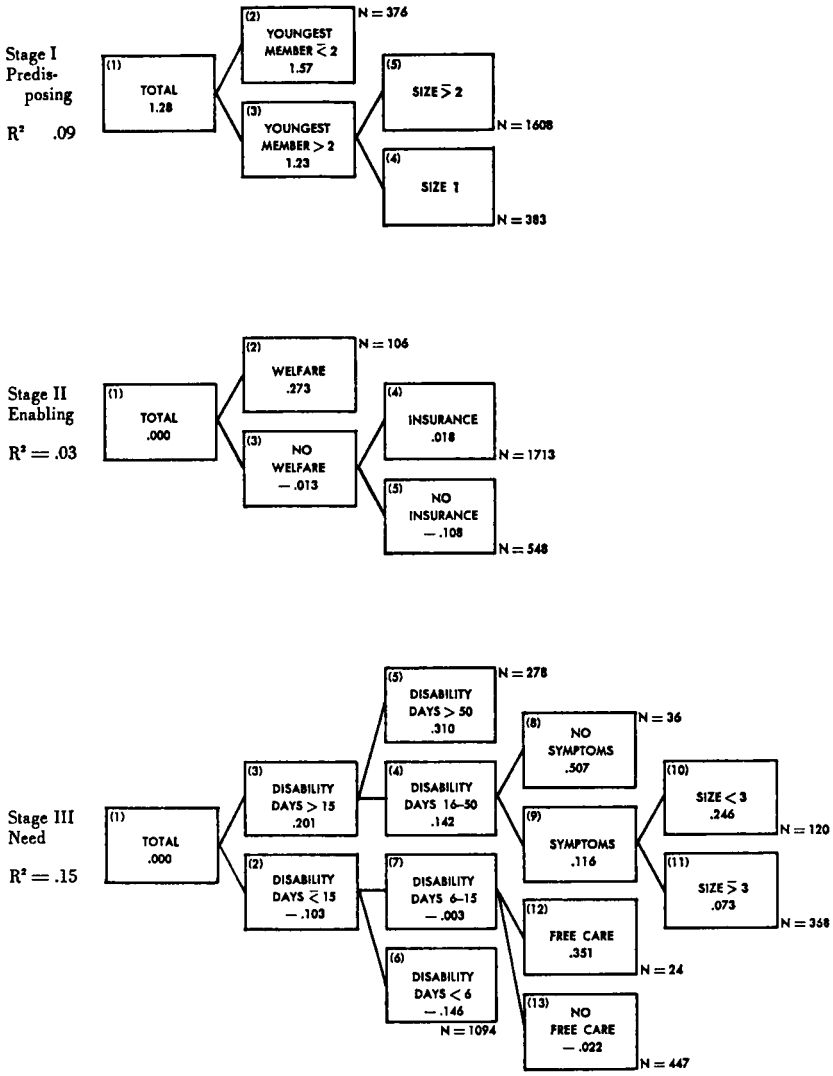


FIG. A–1.—Predictor trees for AID analysis of hospital use

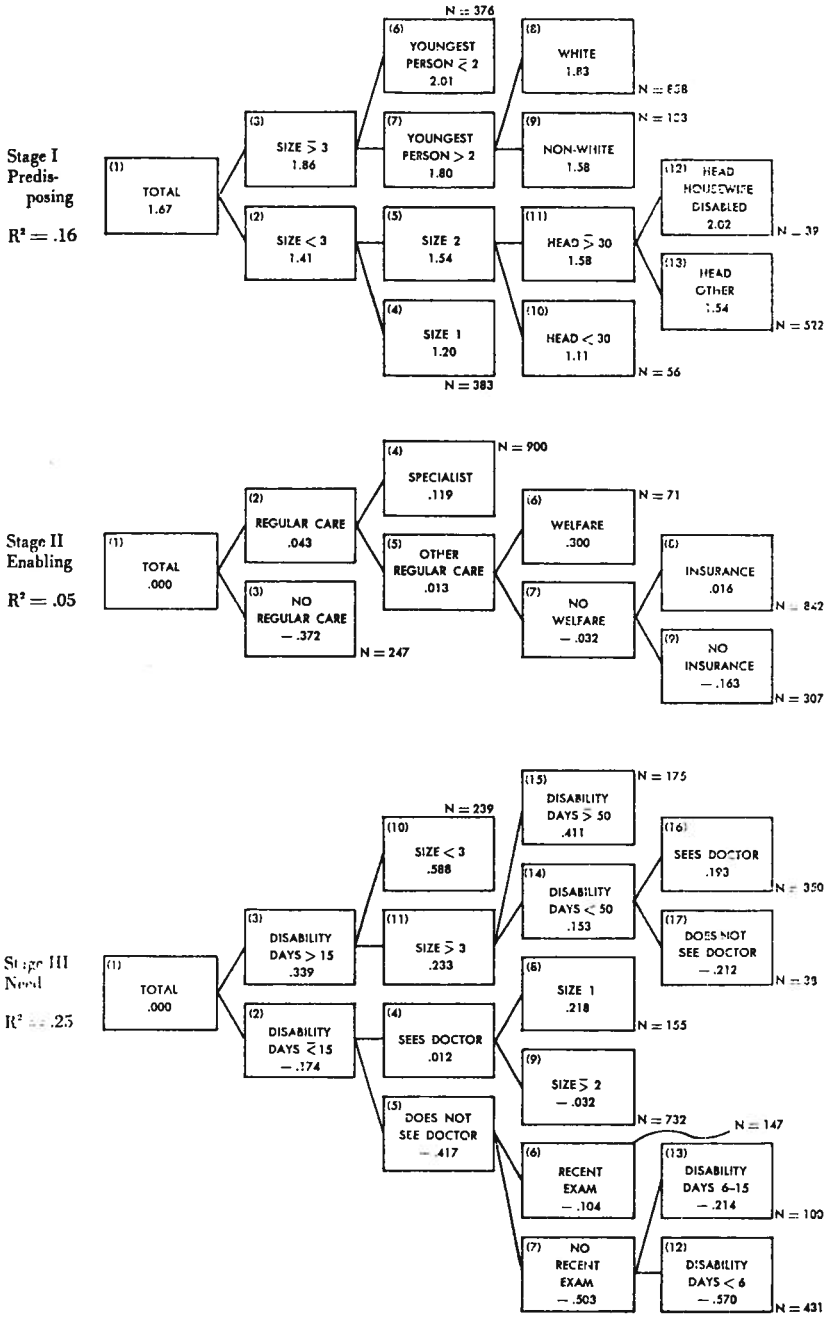


FIG. A–2.—Predictor trees for AID analysis of physician use

APPENDIX B

DESCRIPTION OF VARIABLES

This Appendix includes three sections: (1) rationale for selection of independent variables; (2) definitions of the dependent variables; (3) identification of every variable and the forms of that variable used.

RATIONALE FOR INCLUDING EXPLANATORY VARIABLES IN THE MODEL

Variables were selected on the basis of some logical relationship to components of the model and prior evidence that these were correlated with use. Here, the evidence is reviewed and some of the relationships between the variables and use are discussed.[1] The variables are listed under the subcomponent of the model they represent.

Family Composition

Age of Head (19). Use of most health services increases with age of the individual.[2] Major exceptions to this are: (1) high use of physician services by young children relative to older children;[3] (2) the high use of hospital and physician services by females during the reproductive years;[4] and (3) the declining use of dental services by older people.[5] The relationships between aging and use of health services are even more complicated at the family level. For instance, the age of the head of the family is correlated with other family characteristics which also influence use, particularly family size and child bearing potential. Consequently, some families with relatively young heads of the household are among the highest users.[6]

[1] The literature review emphasizes use patterns. However, studies of consumer expenditures for health services and health and morbidity patterns are also included because of their close association with use patterns.

[2] Confrey and Goldstein (1960); Youmans (1961); Lawrence (1964); Ellenbogen *et al.* (1964); Health Information Foundation (1965, No. 6); Health Information Foundation (1966, No. 3); Royle and Brewster (1966).

[3] NCHS (1965, Series 10, No. 18, p. 13).

[4] NCHS (1965, Series 10, No. 18, p. 14). NCHS (1966, Series 10, No. 30, p. 17).

[5] NCHS (1965, Series 10, No. 23, p. 11).

[6] Katona *et al.* (1963, pp. 103–194); Bureau of Labor Statistics (1964); Josephson (1966).

Age of Oldest Member (21). The age of the oldest family member can be used to single out families where the head is not the oldest member (e.g., an aged parent living in his child's home). Such people tend to be high users of health services because of their age. Their use may also be particularly high because older people living with others are more likely to be ill than are those living alone.[7]

Age of Youngest Member (23). The age of the youngest family member is important for two reasons: (1) there is a "u" shaped relationship between age and use of services, since very young children tend to use more services than older children;[8] and (2) an infant in the family often means that obstetrical services had been used during the survey year with a corresponding increase in total family use.[9]

Sex of Head (17). Females generally use more services than males.[10] Only hospital use, among the major services, shows deviations.[11] While males seem to have a somewhat higher admission rate and longer stays in most age categories, obstetrical admissions cause female admission rates and total hospitalized days used to be higher.[12]

Families headed by women have unique characteristics which might be related to health service use. Families with female heads are likely to include single females, families broken by divorce or separation, and older widows.

Marital Status of Head (18). Marital status of head can show a normal progression in the development of the family (single, married, widowed). There are special health service needs associated with each.[13] Families in which the head is separated or divorced represent a deviation from the normal progression of family development. Such families might also deviate from the norm in their use of health services.

[7] Shanas (1960, pp. 408–411). Also, aged people living in the homes of others have least "power" of all family members in terms of family decision making which might tend to differentiate them from older household heads or their spouses. Scott (1962, pp. 214–228).

[8] For consideration of health service use of young people, see Schiffer (1963); Feldstein, P. (1964, pp. 61–70); Rosenthal (1964, pp. 25–27, 36–38); NCHS (1965, Series 10, No. 19).

[9] Rosenthal (1964, p. 27); Health Information Foundation (1966, No. 2).

[10] NCHS (1965, Series 10, No. 23, p. 16); Health Information Foundation (1966, No. 3); NCHS (1965, Series 10, No. 18, pp. 3–4); NCHS (1966, Series 10, No. 33, p. 14).

[11] Rosenthal predicted that a higher proportion of males in a state would lead to greater utilization of hospitals. Some support for this hypothesis was found (1964, pp. 27–28, 38).

[12] NCHS (1966, Series 10, No. 30, pp. 5–7, 16).

[13] Andersen and Anderson (1965).

Family Size (*15*). In general, the evidence supports the "common sense" expectation that use of health services increases as family size increases. However, there is a tendency for individuals in large families to use fewer services than those in smaller ones.[14] Also, the total amount of dental services used is actually less for the largest families than for somewhat smaller families.[15]

Social Structure

Employment of Main Earner (*26*). Knowing the employment status of main earner allows separation of families with a retired main earner from those with an active one. Apart from the influence of age, main earners in poor health tend to retire before those in good health.[16] Consequently the former would use more health services. In addition, main earners who are working part-time, or who are students, unemployed, or "unable to work" reflect deviations from "normal family progression" which may be related to health service use. For instance, families with heads working full-time might use more services because of a relatively good financial situation and also because these families tend to be larger. However, families with heads who are disabled are more likely to have serious illness to contend with which would increase their use.[17]

Social Class of Main Earner (*28*). Evaluation of social class is based on prestige rankings of the occupation of the family's main earner.[18] The measure is included to get at the family's standard of living. A direct relationship between social class and use has generally been found in the literature.[19] Even though lower social classes might in fact have more "ob-

[14] NCHS (1964, Series 10, No. 9, p. 47) and Health Insurance Plan of Greater New York (1965) show inverse relationships between family size and use and expenditures per person. However, a study of the relationship of family size to measures of illness showed a *direct* relationship between size and frequency of disabling chronic conditions per member. NCHS (1967, Series 3, No. 7, pp. 4–8). Thus, while members of large families use fewer health services, the amount of illness they experience may, in fact, be greater.

[15] Bureau of Labor Statistics (1964).

[16] Thompson and Streib (1958, pp. 18–34); Andersen and Eichhorn (1964, pp. 585–586).

[17] Unemployed persons have considerably higher disability rates than do employed persons. NCHS (1964, Series 10, No. 7, p. 1). Use rates also vary according to people's employment status. See NCHS (1965, Series 10, No. 19, pp. 9, 40–42); NCHS (1966, Series 10, No. 29, pp. 5, 18–20); NCHS (1966, Series 10, No. 30, pp. 11, 44–45).

[18] Duncan (1961).

[19] Relationships between health characteristics and social class are discussed in "Socio-Cultural Approaches to Medical Care" (1952); Graham (1958, pp. 58–66); Laughton (1958); Kriesberg and Treiman (1960, pp. 147–165); MacGregor (1961, pp. 1709–1714); Ross (1962, pp. 35–40); Yeracaris (1962, pp. 193–198); Kriesberg (1963, pp. 334–353); Lebowitz (1964, pp. 1876–1881); Suchman (1965, (1), pp. 1725–1733); Bedger (1966, pp. 829–833); Ireland, ed. (1966); and Solon (1966, pp. 884–894).

jective" illness due to adverse environmental conditions, a higher threshold of perceived need and economic barriers can result in less use of services.

Occupation of Main Earner (30). Occupation is ranked along a continuum of professionalization or skill. Families having main earners with a more skilled occupation generally have a life style that results in greater use of health services. The measure is used in addition to social class due to the special characteristics of some occupations, particularly farming, which make them difficult to rank along a social class continuum.

Education of Head (32). The literature generally shows a direct relation between level of education and amount of health services used.[20] Several reasons are suggested. Highly educated families know more about disease and professional health care services. Such knowledge may lead to greater use of such services. Education contributes to higher income or the use of more specialized sources for regular care which, in turn, increases use. Finally, while the amount of "objective" illness is probably less among members of more highly educated families, their perceptual threshold of conditions of illness requiring treatment may be lower and, consequently, use may be higher.

Race (36). Most sources indicate non-whites use less of each major type of service[21] However, holding constant other social and economic characteristics, Rosenthal found that there was a *positive* relation between proportion of non-whites in an area and hospital use.[22] He explained this in terms of the unfavorable environment in which they live.

Ethnicity (35). Ethnicity is measured by whether the parents of the head were born in the U.S. and whether a foreign language was spoken in his childhood home. Ethnicity indicates differences between subcultures and the dominant culture. These differences include responses to illness.[23]

[20] Croog (1961, pp. 65–70); Rosenthal (1964, pp. 28–29, 40); NCHS (1965, Series 10, No. 23, p. 21); Health Information Foundation (1966, No. 2, p. 3); NCHS (1966, Series 10, No. 33, pp. 16–17); NCHS (1965, Series 10, No. 18, p. 14). Only with respect to hospital use are there indications of an inverse relationship: NCHS (1966, Series 10, No. 30, pp. 10–11).

[21] NCHS (1965, Series 10, No. 20, pp. 3–9); NCHS (1965, Series 10, No. 23, p. 19); NCHS (1965, Series 10, No. 18, pp. 5, 17); NCHS (1966, Series 10, No. 33, p. 15). Inability to obtain services has been explained by economic conditions that bar access to services, lack of knowledge and ability to cope with the present system, and various forms of discrimination which limit minority group access to health services. See Yerby (1966); Eckland (1967, pp. 190–191); Strauss (1967); Richardson (1967).

[22] Rosenthal (1964, pp. 28, 39).

[23] For perceptions of and reactions to illness by various ethnic groups, see Erasmus (1952, pp. 411–428); Zborowski (1952, pp. 16–30); Saunders (1954); Lieberson (1958, pp. 542–547); and Croog (1961, pp. 65–70). In his studies of the population of Wash-

Health Beliefs

Values, attitudes, and knowledge are all considered to be sub-categories of beliefs. The scales and indexes used to measure these sub-categories include value of health services (38), value of physicians (40), value of good health (41), value of health insurance (43), attitude toward health services (45), attitude toward physician use (47), and knowledge of disease (49).[24]

Values are conceptions of the desirable which influence behavior,[25] while attitudes are feelings about particular objects which "flow from" values.[26] For example, the head of the family may, generally, place a positive *value* on the expertise and success of modern medical science. Consequently, his *attitude* toward the use of a particular complicated technique, such as open-heart surgery for himself or a member of his family, might be favorable. Knowledge is verifiable information a person has about a subject. What a person knows, or thinks he knows (knowledge), and how he evaluates what he knows (values and attitudes), are different and can have different behavioral consequences.[27] Thus, the woman who knows the "danger signals" of cancer might be more likely to have regular "paps" tests and other preventive examinations than the woman who is ignorant about the disease even though both have similar values and attitudes.[28]

Family Resources

Income (51). Income tends to be positively related to health service use.[29] Economic barriers to health services are one reason for such a relationship. However, other factors reduce the correlation between family in-

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ington Heights, New York, Suchman found that the lower socioeconomic and minority groups are significantly more socially isolated or ethnocentric. Ethnocentrism, in turn, was highly related to a lower level of knowledge about disease, unfavorable attitudes toward medical care, and dependence upon lay support during illness (1965 (1), p. 1730).

[24] The complex nature of the relationship between belief and health behavior has been considered by Feldman (1966, pp. 115–117); Kriesberg (1963, pp. 34–38); and McNamara and Hassinger (1957, pp. 93–97). Further discussions of health beliefs are found in Koos (1954); Mausner and Mausner (1955, pp. 35–39); Cannell and MacDonald (1956, pp. 315–322); Clark (1958); Hartley *et al.* (1961, pp. 1541–1544); King (1962); Stoeckle *et al.* (1963, pp. 979–981); David (1964, pp. 444–453); Mechanic (1965, pp. 253–257); Phillips (1965, pp. 555–563); Kirscht (1966, pp. 248–254); Rosenstock (1966, pp. 97–102); Watts (1966, pp. 1205–1212).

[25] Kluckhohn (1952, p. 395).

[26] Rosenberg (1957, pp. 1–10).

[27] Hyman (1955, pp. 97–105).

[28] Relationships of knowledge to aspects of health and illness behavior are discussed by Seligman *et al.* (1957, pp. 497–509); Lewis and Lopreato (1962, pp. 508–514); Samora *et al.* (1962, pp. 176–185); Feldman (1966, pp. 89–163); and Blackwell (1967, pp. 83–95).

[29] Feldstein, P. (1964, pp. 60–61); Feldstein and Carr (1964); and Rosenthal (1964, pp. 29–30, 40).

come and use.[30] First, services with no direct cost are much more likely to be used by low income families than by high income families. In addition, illness reduces family income, especially the illness of a wage earner. Similarly, malnutrition and poor living conditions may result in lower income because they adversely affect a person's ability to obtain employment or succeed in business. While use of health services increases in such cases, income decreases.[31]

Savings (52). Savings in the form of liquid assets provide an added resource upon which families can draw to pay for services received. They are especially important for older families, who come to depend more on savings and less on earned income.[32] Generally, a positive correlation is expected between amount of savings and use of health services.[33] However, excessive use over a period of time would tend to deplete family savings. Consequently, family savings might be inversely related to use in some instances.

Health Insurance (54). The insured population uses more health services than the uninsured population.[34] Insured services (mostly hospital and physician services) are more available to the family, since actual direct cost to the patient is removed or reduced, thus doing away with the immediate economic barriers which might exist.

Regular Source of Care (55). Regular source of care describes the person or institution families generally go to when they feel the need for medical advice or treatment. Common sources are specialists, general practitioners and clinics.[35] Since it is the judgment of the personal physician which in large part determines the type and quantity of services received by family members, the variable has particular importance.

[30] National Health Survey data indicate that low income persons report more disability and illness. In contrast, high income persons generally spend more for health services and use more services. Only with respect to hospital services is this relationship unclear. Generally it appears that high income persons have more admissions but low income persons have longer lengths of stay. See NCHS (1963, Series 10, No. 2) and NCHS (1964, Series 10, No. 9).

[31] Lawrence (1948); NCHS (1965, Series 10, No. 20, pp. 6–8).

[32] For discussions of the patterns and functions of family savings see Fisher (1952); Brady (1956); Modigliani and Ando (1957); Schoor (1966).

[33] Wirick and Barlow (1964, pp. 103–105); Wirick (1966, pp. 306–307).

[34] Relationships between coverage and use are shown by Belcher and Hay (1960); Wirick *et al.* (1962, pp. 138–141); Anderson *et al.* (1963, pp. 57–66); Feldstein, P. (1964, p. 60); NCHS (1964, Series 10, No. 11, pp. 19–20); Rosenthal (1964, pp. 30–31, 41); Klein (1965); Andersen and Riedel (1967, pp. 21–28); Cauffman *et al.* (1967).

[35] Relationships between sources of care and use of health services are discussed in Coe and Wessen (1965); Kessel and Shepard (1965); NCHS (1966, Series 10, No. 28); Sloss *et al.* (1966); Solon (1966).

Welfare Care (*56*). Welfare care refers to any health services provided at no cost during the survey year because the family was medically indigent.[36] Free care received for any other reason is not included as welfare medical care. Welfare care represents another means through which families can attain services and is thus defined as an enabling variable.[37]

Community Resources

Physician-Population Ratio (*57*). Physician-population ratio is the number of active, non-federal physicians per 100,000 population in the Standard Metropolitan Statistical Area (SMSA) or rural county in which the family lives. The common expectation is that the larger the ratio, the more services the family will use.[38]

Hospital Bed-Population Ratio (*58*). Hospital bed-population ratio is the number of short term hospital beds per 1000 population in the county of the family residence. Families in counties with relatively more beds are generally expected to use more services.[39]

Residence (*59*). Families living in urban areas have traditionally used more services than families in rural areas.[40] Factors thought to contribute to higher urban use are ease of access to health service facilities and values conducive to health service use.[41]

Region (*60*). The distribution of health care facilities varies considerably

[36] Discussions regarding these services and the people who use them are found in Brightman *et al.* (1958); Feldstein, P. (1964, p. 60); Ireland (1966); Muller (1965); Richardson (1967); Strauss (1967).

[37] It should be remembered that welfare care reflects not only access to free care but also actual use of such services. Consequently, these families probably have more illness as a group than the rest of the families in the study.

[38] Wirick, in his analysis of the Michigan data, used as a measure of availability an index combining number of physicians and hospital beds (1966, p. 308). The variable played some role, though a minor one, in his analysis of use and expenditure patterns.

[39] The relationship of use to number of hospitals is considered by Roemer (1961), and Feldstein, M. (1964).

[40] Contrasts between rural and urban patterns are suggested by Larson and Hay (1952); Buck *et al.* (1955); Hassinger and McNamara (1956); Feldstein, P. (1964, p. 61); Rosenthal (1964, pp. 28, 39).

[41] However, rural areas and urban areas are becoming more similar. Data from the National Health Survey show hospital discharge rates higher in the smaller SMSA's and lower in the large metropolitan areas and on the farms. In contrast, average length of stay was highest for residents of large metropolitan areas while farm residents had average stays shorter than all other categories. With regard to physician and dental visits, rates were highest in the metropolitan areas and lowest in the areas outside of SMSA's. Persons residing on farms in non-metropolitan areas had fewer acquisitions and spent less for medicines than did residents of metropolitan areas and persons in other non-farm areas. See NCHS (1966, Series 10, No. 30, pp. 9, 35); NCHS (1966, Series 10, No. 33, pp. 6, 21, 30); NCHS (1967, Series 10, No. 36, pp. 12–15).

from one section of the country to another.[42] In addition, there is some evidence that the ways in which services are provided by the health service system and used by the population also vary by region.[43] Consequently, the part of the country in which the family lives can influence use patterns.[44]

Illness

Health Level (65). Health level is the most general of the measures of illness, since it is not based on specific symptoms or disabilities. It deals with more comprehensive impressions of health in the family. For each family member a judgment was elicited as to whether the person's health was, in general, excellent, good, fair, or poor.

Symptoms (62). The measure of symptoms of illness is more specifically related to perceived signs of distress which lead families to seek health services. This measure is based on responses to a checklist of twenty symptoms. It is the sum of all symptoms which family members were reported to have experienced during the survey year.

Disability Days (63). Disability days show effects of family illness. Each family was asked the number of days during 1963 that family members were kept in bed, indoors, or away from usual activities as a result of illness.[45]

Among all the measures of need, it is probably most directly related to use of services. Incapacity, along with pain, is the most obvious sign to laymen that treatment may be needed.

Free Care for Major Illness (66). Eligibility for free care is in part an enabling condition because it provides a means of access to medical services.

[42] American Hospital Association (1966).

[43] Department of the Army (1961).

[44] Hirshfeld and Strow found considerable differences in health factors among the states (1946). National Health Survey data show considerable variation in use patterns from region to region. The annual discharge rate is highest in the South and lowest in the Northeast. In contrast, length of stay was highest in the Northeast and lowest in the South. For both, measures in the North Central and West were similar and fell between the extremes. NCHS (1966, Series 10, No. 30, pp. 32–33). Residents of the West region reported the largest number of physician visits per person per year. Among the other three regions the rate was quite similar. Persons living in the Northeast region had the highest rate of dental visits. This rate of 2.1 per person per year doubled the rate for the South of 1.1 visits per person per year according to NCHS (1967, Series 10, No. 36, pp. 13–15). Residents from the South had the highest mean costs per person for medicines and the largest number of acquisitions of prescribed medicines per person per year. NCHS (1966, Series 10, No. 33, pp. 6, 9, 21, 31).

[45] This definition corresponds roughly to that used by the National Health Survey. For patterns of disability days by basic social and demographic characteristics, see NCHS (1965, Series 10, No. 24).

Free care differs from the enabling variable, welfare care, in two respects. First, it *includes* not only care provided to families who could not afford to pay for it themselves but also care provided at no cost to members of the medical profession and their families (professional courtesy), care provided through research programs, and any other free care provided for some other reason besides indigency. Second, it *excludes* incidental care provided at no cost such as polio vaccine, an X-ray for TB, or sample drugs.

Free care for a major illness episode is placed in the need rather than the enabling category because it shows illness as well as access to free care. Further, it is included with the need variables to determine if, controlling for illness, families receiving free care use services differently from other families.

Response

Seeing Doctor for Symptoms (67). For each symptom reported, an inquiry was made to determine whether or not a doctor had been seen for the symptom.[46] Each family is rated according to the frequency with which it responded to symptoms by seeing the doctor.

Regular Physical Examinations (69). In addition to care used in response to illness, a considerable amount is also used for preventive purposes such as regular physical checkups.[47] This type of use is not necessarily related to perception of illness or response to symptoms. Consequently, a measure of regularity of physical examinations for family members is included to tap a family's tendency to use "preventive" services. Of course, frequency of examination is also related to illness levels to the extent the examinations are involved in treatment. So the measure reflects illness as well as prevention.

DEFINITIONS OF HEALTH SERVICES

This section has two objectives. The first is to define the major types of health goods and services discussed in Chapter III. These types include hospital services, physician services, drugs, dental services, and "other"

[46] Feldman's study (1966, p. 46), as well as considerable evidence amassed by Stoeckle, *et al.* (1963), indicates considerable variation in what people do after experiencing a symptom. See also Galloway (1951); Koos (1954); Lowry *et al.* (1958, pp. 198–202); Rosenstock (1960, pp. 295–302); Pearsall (1962, pp. 200–210); and Mechanic (1965, pp. 253–257).

[47] This type of behavior is most pertinent in Rosenstock's discussion of why people use health services, (1966). See also Ellenbogen (1964); and NCHS (1965, Series 10, No. 19, pp. 10–12). The latter shows that rates of children's routine checkups are higher for children with the following characteristics: under 6; white; high social class; metropolitan residence; and location in Northeast region (rates were lowest in the South).

services. The second is to provide detailed tables to supplement the explanations for the construction of hospital use (Table B-1) and physician use (Table B-2) indexes.

Hospital Services

This refers to care received by an individual who is admitted as an inpatient to a hospital, nursing home, sanitarium or other such institu-

TABLE B-1

CONSTRUCTION OF HOSPITAL USE INDEX

(1) Type of Hospital Day		(2) Number of Days per Year	Weights		(5) Units per Day (3)+(4)	(6) Units per Year (2)×(5)
			(3) Room and Board[c]	(4) Ancillary Services[e]		
Admission[a]	Accommodation[b]					
Medical.....	Private	f_1	31.2	22.8	54	(f_1) 54
	Semiprivate	f_2	26.4	19.3	46	(f_2) 46
	Ward	f_3	23.1	16.9	40	(f_3) 40
Surgical.....	Private	f_4	31.2	30.6	62	(f_4) 62
	Semiprivate	f_5	26.4	25.9	52	(f_5) 52
	Ward	f_6	23.1	22.6	46	(f_6) 46
Obstetrical...	Private	f_7	35.3[d]	26.8	62	(f_7) 62
	Semiprivate	f_8	29.8[d]	22.7	53	(f_8) 53
	Ward	f_9	26.1[d]	19.8	46	(f_9) 46

Total hospital use units per person = $\epsilon(6)$.
Total hospital use units per family = $\epsilon\epsilon(6)$ for all family members.

[a] Medical: All admissions not designated surgical or obstetrical.
Surgical: All admissions other than obstetrical including one or more surgical procedures. A surgical procedure was defined as any cutting procedure or setting of a dislocation or fracture. Endoscopic procedures and suturing of wounds often classified as surgical procedures are not so classified in this study.
Obstetrical: All admissions for females related to pregnancy or complications thereof including predelivery and post-delivery admissions. Admissions related to deliveries which included a surgical procedure such as a cesarean delivery or a dilation and curettage at the time of a miscarriage are defined as obstetrical rather than surgical admissions.

[b] Private: One bed to a room.
Semiprivate: Two beds to a room.
Ward: Three or more beds to a room.

[c] Derived from average retail prices in 20 cities. Weight given to price in each city based on 1960 population of the Standard Metropolitan Statistical Area in which the city is located. See Bureau of Labor Statistics (1962).

[d] Weight multiplied by a constant of 1.13. Room and board costs per day were 13 per cent higher than similar costs for other types of admissions. One reason for this difference was that nursery charges were included in the mother's room and board charges. Thus the standard room and board charges were adjusted for maternity admissions.

[e] Derived by multiplying column 3 (room and board) by a constant. Separate constants were determined for medical admissions (.73); surgical admissions (.98); and obstetrical admissions (.76). Each constant is the ratio of costs for ancillary services to those for room and board for each type of admission as determined from the cost data provided by hospitals during the verification of hospital admissions.

tion. It includes room and board, laboratory fees, drugs, X-rays, operating and delivery room services and the usual extras. It includes services provided by the pathologist, radiologist, and anesthesiologist when these are included in the hospital bill. However, it attempts to exclude services of a special duty nurse in the hospital (included in "other" services) and services provided by a pathologist, radiologist, and anesthesiologist when these latter practitioners bill the patient directly (included in physician services).

TABLE B-2

CONSTRUCTION OF PHYSICIAN USE INDEX

(1) Type of Physician Service[a]	(2) Number of Services per Year	Weights		(5) Units/Person/Year (2)×(3)×(4)
		(3) Relative Value[b]	(4) Constant[c]	
Office (clinic) visits.....	f_1	1	5	(f_1) (1) (5)
Home visits.....	f_2	2	5	(f_2) (2) (5)
Hospital visits.....	f_3	1	5	(f_3) (1) (5)
Hospital surgical procedure 1.....	f_{4_1}	R_1	5	(f_{4_1}) (R_1) (5)
Hospital surgical procedure 2.....	f_{4_2}	R_2	5	(f_{4_2}) (R_2) (5)
.	.	.	.	.
.	.	.	.	.
.	.	.	.	.
Hospital surgical procedure n.....	f_{4_n}	R_n	5	(f_{4_n}) (R_n) (5)

Total physician use units per person = $\epsilon(5)$.
Total physician use units per family = $\epsilon\epsilon(5)$ for all family members.

[a] Physician visits based on respondent reports. Hospital surgical procedures based on hospital report.

[b] See California Medical Association (1960). Median and modal fees were collected from approximately 6,800 members regarding 600 procedures. The purpose was to discover the relationship or relative value that one procedure bears to another, not the dollar charges. Consequently, the actual dollars were multiplied by an arbitrarily chosen conversion factor. The result was a unit value rather than a dollar value for each procedure.

The assignment of a relative value for each procedure suffers from a lack of detailed information regarding the type of visit. Consequently, for office, home, and hospital visits, the relative value of the visit thought to be most common (follow-up routine visit) was assigned to all visits. The more detailed technical information provided by the hospital allowed more explicit coding of hospitalized surgical procedures. Professional medical advice regarding the coding was sought in doubtful cases.

[c] In order to make the physician use index roughly comparable to the hospital use index, it was necessary to attempt to convert the relative values to dollar equivalents. While the relative value publication warns against such conversions to actual dollars, and also cautions about the lack of relationship between the values for visits and surgical procedures, comparison of units to actual charges seemed to indicate that a conversion constant of five would be appropriate in a gross manner for the purposes of this study. That is, using the constant would provide dollar equivalents which might be summed with or compared to dollar equivalents determined for the hospital use index.

Physician Services

These services include all care provided by physicians except those provided to hospitalized inpatients as described above. It includes other hospital inpatient care and physician care provided in hospital outpatient departments and clinics, private offices, and homes.

Drugs

This measure is based on charges for medicines prescribed at some time by the physician, other medical practitioner, or dentist and purchased by the consumer directly from the pharmacy or elsewhere. Excluded are medicines administered by the doctor or dentist and charged for on his bill as well as medicines received in a hospital and included in the hospital bill. Also included are charges for non-prescribed medicines and drugs which the customer purchases of his own volition, such as tonics, vitamins, drops, etc.

Dental Services

These are charges by the dentist for his services and those of his auxiliary personnel and charges for dental appliances. Included also are expenditures to cover charges made to him by dental laboratories and dental manufacturers for work done at his request.

Other Services

This category includes charges by non-medical practitioners for special-duty nursing in the hospital other than that provided by the hospital as part of its regular service and included in the regular hospital bill; for services by an optometrist, optician, or optical company including charges for eye glasses; by other practitioners such as physical therapists, practical nurses, midwives, the registered nurse in the home, podiatrists, Christian Science practitioners, and chiropractors.

Also included are charges for appliances and prostheses such as eye glasses, hearing aids, crutches, wheelchairs, braces, orthopedic shoes, elastic stockings, and vaporizers. Other charges in this category are for ambulance fees, oxygen if not billed for by a hospital or doctor directly, dressings and bandages purchased for the use of a patient at home, and diagnostic tests and X-rays given by a non-hospital laboratory and for which the patient was billed directly.

LIST OF VARIABLES

Table B-3 lists every variable used in the study. Each variable is identified by a number which has been referred to throughout the text. The

list includes a description of the variable and an explanation of the categories included in the variable. It also gives the number of families found in each.

It will be noted that some variables have several forms. This resulted from the requirements of the various types of analyses used in the study. Thus, the list includes three forms of the physician use measure: (1) a continuous form used for Pearson Product-Moment Correlations; (2) a discrete form for contingency tables and TAU and PHI correlation coefficients; and (3) a log transformation of the continuous form for the AID analysis. In addition, two forms of an independent variable were sometimes needed for AID analyses of different types of use. For example, using the rules discussed in Appendix B for determining number of classes of a predictor resulted in one form of the predictor, "age of youngest member", for analyzing physician use designated as "M" (monotonic) with six classes (variable 24). A different form was specified for the total, hospital, and dental analysis which was designated "F" (free) and included five classes (variable 25).

TABLE B-3

LIST OF VARIABLES

Identification Number	Description	Classes	Number of Families
1.....	Total use	Continuous: mean = 439 units	2367
2.....	Total use	1. 0—24 units 2. 25– 49 units 3. 50–149 4. 150–299 5. 300–599 6. 600–999 7. ≥ 1000	215 166 536 479 477 232 262
3.....	Total use	Continuous: mean = 2.28 var[a] 3 = Log10 (var 1+2)	2367
4.....	Hospital use	Continuous: mean = 164 units	2367
5.....	Hospital use	1. 0 units 2. 1–199 3. 200–499 4. ≥ 500	1698 212 233 224
6.....	Hospital use	1. 0 units 2. ≥ 1	1698 669
7.....	Physician use	Continuous: mean = 116 units	2367
8.....	Physician use	1. 0 units 2. 1– 14 3. 15– 39 4. 40– 89 5. 90–174 6. 175–299 7. ≥ 300	266 241 446 503 415 237 259
9.....	Physician use	Continuous: Mean = 1.67 var 7 = Log10 (var 5+2)	2367
10.....	Drug use	Continuous: mean = 75 units	2367
11.....	Other use	Continuous: mean = 35 units	2367
12.....	Dental use	Continuous: mean = 48 units	2367
13.....	Dental use	1. 0 units 2. 1– 24 3. 25– 74 4. 75–124 5. ≥ 125	983 490 431 198 265
14.....	Dental use	1. 0 units 2. ≥ 1	983 1384

[a] "Var" refers to variable with subsequent identification number throughout this list (i.e., var 3 = variable with identification number 3).

TABLE B-3—*Continued*

Identification Number	Description	Classes	Number of Families
15.....	Family size	1. 1 person 2. 2 3. 3 4. 4 5. 5 6. ≥ 6	383 617 427 404 259 277
16.....	Family size	Function of var 15: 1=1/2=2/3=3/4=4, 5/5=6[b]	
17.....	Sex of head	1. Male 2. Female	1905 462
18.....	Marital status of head	1. Single 2. Married 3. Widowed 4. Divorced, separated	147 1741 325 154
19.....	Age of head Head self defined by respondent except male member of married couple always coded head	1. ≤ 24 years old 2. 25–29 3. 30–34 4. 35–44 5. 45–54 6. 55–64 7. 65–74 8. ≥ 75 No answer (NA)[c]	140 209 233 504 470 361 289 146 15
20.....	Age of head	Function of var 19: 1=1, 2/2=3, 4/3=5, NA/ 4=6/5=7, 8	
21.....	Age of oldest member	1. ≤ 24 2. 25–29 3. 30–34 4. 35–44 5. 45–54 6. 55–64 7. 65–74 8. ≥ 75 NA	139 194 213 463 449 362 330 209 8
22.....	Age of oldest member	Function of var 21: 1=1/2=2, 3/3=4, 5, NA/ 4=6, 7/5=8	
23.....	Age of youngest member	1. ≤ 2 years old 2. 3–5 3. 6–13 4. 14–17 5. 18–20 6. ≥ 21 NA	376 219 432 179 119 1034 8
24.....	Age of youngest member	Function of var 23: 1=1/2=2/3=3/4=4/5=5/ 6=6, NA	

[b] The number on the left side of the equation is the "new" class of the variable. The numbers(s) on the right indicate(s) the "old" class(es) included. Similar notation is used for subsequent variables.

[c] For the rest of Appendix B, NA means "no answer."

TABLE B-3—*Continued*

Identification Number	Description	Classes	Number of Families
25.....	Age of youngest member	Function of var 23: 1=1/ 2=2/ 3=3/ 4=4, 5/ 5=6, NA	
26.....	Employment of main earner Person with primary responsibility for family maintenance	1. Working full-time 2. Working part-time 3. Unemployed, laid off 4. Retired 5. Housewife 6. Student 7. Unable to work 8. Other	1667 177 74 224 102 41 75 7
27.....	Employment of main earner	Function of var 26: 1=1/ 2=2, 6/ 3=3/ 4=4/ 5=5/ 6=7, 8	
28.....	Social class of main earner Socio-economic index based on prestige rankings of occupations as developed by Duncan, (1961, pp. 263–275). Rank for main earner coded 3, 4, 7, 8 in var 26 based on last regular occupation. Rank if code 5 or 6 in var 26 based on occupation in 1963 from which $100 or more was earned. If no regular job for 3, 4, 7, 8, or $100 not earned for 5, 6, social class, coded "NA."	1. 00–09 (low) 2. 10–19 3. 20–29 4. 30–39 5. 40–49 6. 50–59 7. 60–69 8. 70–79 9. 80–99 (high) NA	262 636 260 223 242 168 208 137 117 114
29.....	Social class of main earner	Function of var 28: 1=1/ 2, NA=2/ 3=3/ 4=4/ 5=5/ 6=6/ 7=7/ 8=8/ 9=9	
30.....	Occupation of main earner From Bureau of the Census, (1950). Same pattern for main earners coded 3–8 in var 26 as described in var 28.	1.Laborers (except farm & mine) 2. Farmers and farm laborers 3. Service workers (household and others) 4. Operatives 5. Craftsmen 6. Clerical and sales workers 7. Managers, officials and proprietors 8. Professional and technical NA	171 165 235 377 440 320 273 272 114
31.....	Occupation of main earner	Function of var 30: 1=2/ 2=1, 3/ 3=4, NA/ 4=5, 6/ 5=7, 8	
32.....	Education of head	1. 0 years formal education 2. 1– 4 3. 5– 6 4. 7– 8 5. 9–11 6. 12 7. 13–15 8. $\geq$ 16 NA	19 108 152 455 423 569 255 278 108

TABLE B-3—*Continued*

Identification Number	Description	Classes	Number of Families
33.....	Education of head	Function of var 32: 1=1, 2/ 2=3, 4/ 3=5, NA/ 4=6, 7/ 5=8	
34.....	Education of head	Function of var 32: 1=1, 2/ 2=3/ 3=4/ 4=5, NA/ 5=6/ 6=7/ 7=8	
35.....	Ethnicity	1. *Neither* of conditions below 2. *One* of conditions below 3. At least one of head's parents born outside of U.S. *and* language other than English spoken in head's childhood home	1490 389 488
36.....	Race	1. Non-white 2. White NA	324 2014 29
37.....	Race	Function of var 36: 1=1/ 2=2, NA	
38.....	Value of health services Six item Guttman type scale:[d] *a.* Some home remedies are still better than prescribed drugs for curing illness. −=SA; +=TA, TD, SD, NA[e] *b.* If you wait long enough, you can get over most any disease without medical aid. −=SA, TA; +=TD, SD, NA *c.* A person understands his own health better than most doctors do. −=SA, TA; +=TD, SD, NA *d.* No matter how well a person follows his doctor's orders, he has to expect a good deal of illness in his lifetime. −=SA, TA; +=TD, SD, NA *e.* Good personal health depends more on an individual's strong will power than on vaccinations, shots, and vitamins. −=SA, TA, TD, NA; +=SD *f.* Modern medicine can cure most any illness. −=TA, TD, SD, NA; +=SA	Exact scale types:[f] a b c d e f 1. − − − − − − 2. + − − − − − 3. + + − − − − 4. + + + − − − 5. + + + + − − 6. + + + + + − 7. + + + + + + NA (No response to *any* item) Reproducibility[g] = .91	27 150 362 641 633 369 63 121
39.....	Value of health services	Function of var 38: 1=1/ 2=2/ 3, NA=3/ 4=4/ 5 =5/ 6=6/ 7=7	

[d] For a discussion of the Guttman scaling technique, see Goode and Hatt (1952, pp. 284–295).

[e] For this and subsequent scales: SA = strongly agree; TA = tend to agree; TD = tend to disagree; SD = strongly disagree; NA's assigned to largest response category.

[f] Error types assigned to class pattern with same number of "plus" responses for all Guttman scales.

[g] For a definition of reproducibility, see Goode and Hatt (1952, pp. 293–294).

TABLE B-3—*Continued*

Identification Number	Description	Classes	Number of Families
40.....	Value of physicians Five item Guttman type scale: *a.* The care I have generally received from doctors in the last few years was excellent. −=SD, TD; +=TA, SA, NA *b.* The medical profession is about the highest calling a man can have in this country. −=SD, TD; +=TA, SA, NA *c.* A person understands his own health better than most doctors do. −=SA, TA; +=TD, SD, NA *d.* Choosing your own doctor is about the most important thing in getting good medical care. −=SA, TA, TD, NA; +=SD *e.* Most doctors are more interested in their incomes than in making sure everyone receives adequate medical care. −=SA, TA ,TD, NA; +=SD	Exact scale type: a b c d e 1. − − − − − 2. + − − − − 3. + + − − − 4. + + + − − 5. + + + + − 6. + + + + + NA Reproducibility = .89	25 173 573 808 478 189 121
41.....	Value of good health (Elicited from stem question, "How likely would you be to make each of the following changes if doctors said it was necessary to protect your health?") Nine item Guttman type scale: *a.* Get more rest and sleep. −=U, VU: +=VL, L, NA[h] *b.* Get more exercise. −=U, VU; +=VL, L, NA *c.* Stop eating some favorite foods. −=U, VU; +=VL, L, NA *d.* Cut down on the amount of work you do. −=U, VU; +=VL, L, NA *e.* Spend less time doing things with family and friends. −=U, VU; +=VL, L, NA *f.* I do the best I can to take care of my own health. −=TA, TD, SD; +=SA, NA *g.* Spend several weeks in a convalescent hospital. −=U, VU, NA; +=VL, L *h.* Move to a different part of the country. −=L, U, VU, NA; +=VL *i.* The costs of medical care, in general, are much too high. −=SA, TA, NA; +=TD, SD	Exact scale types: a b c d e f g h i 1. − − − − − − − − − 2. + − − − − − − − − 3. + + − − − − − − − 4. + + + − − − − − 5. + + + + − − − − − 6. + + + + + − − − − 7. + + + + + + − − − 8. + + + + + + + − − 9. + + + + + + + + − + + + + + + + + + NA Reproducibility = .91	33 191 369 569 418 318 197 95 56 121

[h] VL ≡ respondent very likely to make above change to safeguard or improve his health; L = likely; U = unlikely; VU = very unlikely.

TABLE B-3—*Continued*

Identification Number	Description	Classes	Number of Families
42.....	Value of good health	Function of var 41: 1=1/ 2=2/ 3=3, NA/ 4=4/ 5=5/ 6=6/ 7=7/ 8=8/ 9=9	
43.....	Value of health insurance Two item index: *a.* Health insurance which covers all medical costs, but is good *only* with hospitals and doctors who sign up with it is a good idea. −=TD, SD, NA; +=SA, TA *b.* Some kinds of health insurance which cover all the medical expenses I (and my family) might have is a good idea. −=TD, SD; +=SA, TA, NA	a b 1. − − 2. + − 2. − + 3. + + NA	 146 1439 661 121
44.....	Value of health insurance	Function of var 43: 1=1/ 2=2, NA/ 3=3	
45.....	Attitude toward health services Six item Guttman type scale: *a.* If you wait long enough, you can get over most any disease without getting medical aid. −=SA; +=TA, TD, SD, NA *b.* I'll avoid seeing a doctor whenever possible. −=SA; +=TA, TD,SD,NA *c.* I wouldn't go to a hospital unless there was just no other way to take care of me. −=SA; +=TA, TD, SD, NA *d.* Even if a person is feeling good, he should get a general physical examination every year. −=TA, TD, SD; +=SA, NA *e.* If a doctor told me I needed a major operation, I would have it done immediately. −=TA, TD, SD, NA; +=SA *f.* I didn't want to spend the money on a doctor unless I had to. I was too busy to see a doctor; I just didn't have time. I don't like to bother the doctor unless it's necessary. The doctor might find something really wrong with me. +="No" to all four items. −= Not "no" to all four items.	Exact scale types: a b c d e f 1. − − − − − − 2. + − − − − − 3. + + − − − − 4. + + + − − − 5. + + + + − − 6. + + + + + − 7. + + + + + + NA Reproducibility = .90	 36 126 280 635 675 390 104 121
46.....	Attitude toward health services	Function of var 45: 1=1/ 2=2/ 3=3, NA/ 4=4/ 5=5/ 6=6/ 7=7	

TABLE B-3—*Continued*

Identification Number	Description	Classes	Number of Families
47.....	Attitude toward physician use (Elicited from stem question, "Do you agree or disagree that you should see a doctor right away for each of the following symptoms?") Six item Guttman Scale: *a.* Diarrhea (loose bowel movements) for about a week. −=TD, SD; +=SA, TA, NA *b.* Sore throat or running nose with a fever as high as 100° F for two days or more. −=TD, SD; +=SA, TA, NA *c.* Severe shortness of breath after light work. −=TA, TD, SD; +=SA, NA *d.* Unexplained loss of over 10 pounds in weight. −=TD, SD, NA; +=SA, TA *e.* Feeling tired for several weeks for no special reason. −=TA, TD, SD, NA; +=SA *f.* Sore throat or running nose for a couple of days, but no fever. −=TA, TD, SD, NA; +=SA	Exact scale types a b c d e f 1. − − − − − − 2. + − − − − − 3. + + − − − − 4. + + + − − − 5. + + + + − − 6. + + + + + − 7. + + + + + + NA Reproducibility = .95	 115 202 596 358 400 479 96 121
48.....	Attitude toward physician use	Function of var 47: 1=1/ 2=2/ 3=3/ 4=4, NA/ 5=5/ 6=6/ 7=7	
49.....	Knowledge of disease Ten item index based on agreement that each symptom might be early sign of associated disease. *a.* Shortness of breath after light exercise may be a sign of *cancer.* −=A; +=D *b.* Shortness of breath after light exercise may be a sign of *heart disease.* −=D; +=A. *c.* Coughing or spitting up of blood may be a sign of *tuberculosis.* −=D; +=A d. Coughing or spitting up of blood may be a sign of *diabetes.* −=A; +=D *e.* Open sores or ulcers that do not heal may be a sign of *cancer.* −=D; +=A *f.* Open sores or ulcers that do not heal may be a sign of *heart* disease. −=A; +=D. *g.* Unexplained loss of weight may be a sign of *tuberculosis.* −=D; +=A	Points assigned for response: +=2 (acceptable answer based on agreement of independent judgments of three physician panel); undecided or NA=1; −=0 1. 0–11 points 2. 12 3. 13 4. 14 5. 15 6. 16 7. 17 8. 18 9. 19–20 NA	 311 217 216 327 284 391 215 216 69 121

TABLE B-3—*Continued*

Identification Number	Description	Classes	Number of Families
49 *contd.*	*h.* Unexplained loss of weight may be a sign of *diabetes.* −=D; +=A *i.* Pains in the chest may be a sign of *heart disease.* −=D; +=A *j.* Pains in the chest may be a sign of *tuberculosis.* −=A; +=D		
50.....	Knowledge of disease	Function of var 49: 1=1/ 2=2/ 3=3, NA/ 4=4/ 5=5/ 6=6/ 7=7/ 8=8/ 9=9	
51.....	Income Total income before taxes for the survey year for all family members.	1. ≲ $1,499 2. 1,500– 3,999 3. 4,000– 6,999 4. 7,000–12,499 5. ≳ 12,500	214 539 688 699 227
52.....	Savings Based on response to query regarding "current savings such as in banks, savings and loan associations, or government bonds that the family might use to meet heavy medical costs in an emergency. . . ."	1. ≲ $199 2. 200– 999 3. 1000–2999 4. ≳ 3000 NA	1115 564 268 320 100
53.....	Savings	Function of var 52: 1=1, NA/ 2=2/ 3=3/ 4=4	
54.....	Health insurance Family defined as "insured" if one or more members covered on the last day of the survey year by a plan specifically designed to pay all or part of his (their) medical or hospital expenses	1. No 2. Yes	1751 616
55.....	Regular source of care	1. No source indicated for any family member. 2. At least one member reports non-M.D. as source; no M.D.'s, no clinics reported in family. 3. At least one member uses clinic regularly; no individual M.D. mentioned. 4. At least one family member has GP as regular doctor; no specialist for family. 5. At least one family member has internist as regular doctor; no other specialist for family. 6. At least one family member has specialist other than internist as regular physician.	247 33 213 974 210 699

TABLE B-3—*Continued*

Identification Number	Description	Classes	Number of Families
56.....	Welfare care Medical goods and services provided to any family member during 1963 at no direct cost or at substantially reduced rates because the family was generally defined as being financially unable to pay.	1. No 2. Yes	2261 106
57.....	Physician-population ratio Non-federal, active physicians per 100,000 population for Standard Metropolitan Statistical Area or county of family residence. From United States Public Health Service, (1960).	1. $\leq$ 49 2. 50– 99 3. 100–124 4. 125–149 5. 150–174 6. $\geq$ 175	263 663 357 414 398 272
58.....	Hospital bed-population ratio Short-term hospital beds per 10,000 population, by county of family residence. From American Hospital Association, (1963) Base population, 1960.	1. $\leq$ 14 2. 15–29 3. 30–44 4. 45–59 5. 60–74 6. 75–99	159 476 740 601 260 131
59.....	Residence Classifications of each household dwelling according to urban–rural and farm–non-farm characteristics. Definition of urban and rural areas as based on data from Bureau of the Census, (1960). Farm or non-farm dwelling for rural families based on interviewer's designation.	1. Rural farm 2. Rural non-farm 3. Other urban: all families living in urban areas not defined as "large urban." 4. Large urban: families living in urban areas of the ten largest Standard Metropolitan Statistical Areas.	201 522 1111 533
60.....	Region Section of the country of family residence according to Bureau of the Census definition. See Bureau of the Census, (1960).	1. New England 2. Middle Atlantic 3. East North Central 4. West North Central 5. South Atlantic 6. East South Central 7. West South Central 8. Mountain 9. Pacific	101 427 424 257 371 125 249 83 330
61.....	Region	Function of var 60 1 = 1, 2/ 2 = 3, 4/ 3 = 5–7/ 4 = 8, 9	
62.....	Symptoms *a*. Cough any time during the day or night which lasted for three weeks? *b*. Sudden feelings of weakness or faintness? *c*. Getting up some mornings tired and exhausted even with a usual amount of rest?	1. No symptoms in family, NA 2. 1– 3 symptoms 3. 4– 6 4. 7–10 5. $\geq$ 11	330 758 562 406 311

TABLE B-3—*Continued*

Identification Number	Description	Classes	Number of Families
62 *contd.*	*d.* Feeling tired for weeks at a time for no special reason? *e.* Frequent headaches? *f.* Skin rash or breaking out on any part of the body? *g.* Diarrhea (loose bowel movements) for four or five days? *h.* Shortness of breath even after light work? *i.* Waking up with stiff or aching joints or muscles? *j.* Pains or swelling in any joint during the day? *k.* Frequent backaches? *l.* Unexplained loss of over ten pounds in weight? *m.* Repeated pains in or near the heart? *n.* Repeated indigestion or upset stomach? *o.* Repeated vomiting for a day or more? *p.* Sore throat or running nose with a fever as high as 100° F for at least two days? *q.* Nose stopped up, or sneezing, for two weeks or more? *r.* Unexpected bleeding from any part of the body not caused by accident or injury? *s.* Abdominal pains (pains in the belly or gut) for at least a couple of days? *t.* Any infections, irritations, or pains in the eyes or ears?		
63.....	Disability days Total number of days during 1963 when family members were "kept in bed, indoors or away from usual activities."	1. No disability days, NA 2. 1– 5 days 3. 6–10 4. 11–15 5. 16–25 6. 26–50 7. ≥ 51	696 398 284 187 237 287 278
64.....	Disability days	Function of var 63: 1=1/ 2=2/ 3=3–5/ 4=6/ 5=7	
65.....	Health level Combination of responses for each family member to question, "Would you say your (person's) health, in general, is excellent, good, fair, or poor?"	1. All "excellent" or all NA 2. "Good" lowest rating given 3. "Fair" lowest rating given 4. At least one "poor"rating	622 919 569 257

TABLE B-3—*Continued*

Identification Number	Description	Classes	Number of Families
66.....	Free care for major illness Medical goods and services provided to the family at no direct cost or at substantially reduced rates and without benefits being provided by any type of health insurance plan. This care must have been provided for a hospitalized illness, other major, non-hospitalized illness or a pregnancy. In addition, all or most of the care for the condition must have been provided in this manner.	1. No 2. Yes	2230 137
67.....	Seeing doctor for symptoms reported as occurring during 1963 or up to the interview date in 1964. (see var 62 for symptoms included)	1. Doctor not seen for any symptoms. 2. Doctor seen for some symptoms (or like symptoms from an earlier period) before 1963, some never. 3. Doctor seen for some symptoms in 1963, some earlier, some never. 4. Doctor seen for all symptoms sometime. 5. Doctor seen for all symptoms in 1963. NA, no symptoms reported	309 165 916 246 401 330
68.....	Seeing doctor for symptoms	Function of var 67: 1=NA/ 2=1/ 3=2/ 4=3, 4/ 5=5	
69.....	Regular physical examinations	1. No member has had a physical examination within 5 years, NA. 2. Some within 5 years, some over 5 years. 3. All within 5 years, some over 2 years. 4. All within 2 years, some over 1 year. 5. All within 1 year.	150 607 450 481 679

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