Medical Care Use in Sweden and the United States

A Comparative Analysis of Systems and Behavior

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FOREWORD

The value of international comparisons of health services is the urgent questioning they generate. Can the United States claim a physician shortage with a much higher ratio of physicians to population than Sweden? Is the longer hospital stay in Sweden better patient care? This report demonstrates many differences in staffing and the use of health services which should lead to productive review of practice in both countries.

The research here reported had its origin in the long term interest of Odin Anderson in international comparisons of health services. Beginning in 1958, overtures were made to the chief medical officers of Sweden and Great Britain in an effort to stimulate nationwide social surveys for the collection of data which might be compared. Dr. Arthur Engel, at that time Director General of the Swedish National Board of Health, saw the importance of the problem and the need of research in the field. He referred Odin Anderson to the Department of Social Medicine in Uppsala, as this institution already had documented interest in medical care research. Dr. Engel also used his authority for arranging financial support from the Swedish Government.

Osler Peterson, Professor, Department of Preventive Medicine, Harvard University Medical School, cooperated in opening up joint research prospects. From this has developed a comparison of patients in hospitals between the U.S., Sweden, and Great Britain. The study reported here for the U.S. is based on one of a series stemming from household surveys in the United States covering the range of personal health services. The first household survey in the series in the United States collected data for the year 1953, the second for 1958, and again for this study in 1963.

It is hoped these international comparisons of the use of health services can continue. From the first, it has been anticipated that a value of the research here reported might be a continuing association between study personnel at the Universities of Uppsala and Chicago.

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Our efforts have profited greatly from sage advice by our consultants, who, while not responsible for the study's weaknesses, have certainly contributed to whatever merits it has. Therefore, we wish to thank Jack Feldman for his penetrating comments during the formative stage of the study and Gunnar Eklund who has given many hours over the duration of this project in an effort to help us avoid methodological pitfalls and make our interpretations more meaningful.

The social surveys which produced the data for this report were large scale national efforts which required the marshalling of considerable personnel and technical expertise. The sampling, field work, and data processing for the U.S. study were carried out by the National Opinion Research Center of the University of Chicago. In Sweden the collection of record data required support from the National Social Insurance Board and much assistance, which was made readily available, from the public insurance funds. The public health nurses and their employers, the county councils, responded very positively to the requests for help with the field work.

This final product is the result of several hundred manpower hours of laborious effort involved in the organization of our data and preparation of the manuscript. For their contribution in completing these tasks we extend our appreciation to Diane Andersen, Karin Ansari, Dagmar Lagerberg, Karin Linder, Joanna Kravits, and Wesley Tator.

Finally, we wish to acknowledge the several institutions which provided funds necessary to finance this project. Those financing the U.S. part of the study include the Center for Health Administration Studies of the University of Chicago and the United States Public Health Service (Grant No. HS 00080-05). The Swedish part of this study was supported by the Ministry of Health and Social Affairs in Sweden and by the Swedish Medical Research Council (project Nos. B69-27P-2383-02, B69-19X-2341-02A, and B70-19X-2341-03B). The University of Uppsala provided computer facilities for processing of the data.

CHAPTER I

INTRODUCTION

The purpose of this monograph is to investigate why people in the United States and Sweden differ in the types and amounts of health services they use.[1] The analysis is based on comparable social surveys conducted in the two countries in early 1964.[2] For both countries, the samples are representative of the population as a whole.

If it were feasible, we would like to study the influence of medical care systems on the health and general well-being of populations. Such a study does not seem possible at this time, however. It is difficult to separate the effects of health care from other influences such as genetic factors, climate, and diet. Another major problem is measuring level of health or *well-being*, especially in a social survey. Measures such as infant mortality and life expectancy are no longer sensitive enough to make

[1] In addition to this research report some other publications have resulted from our comparative endeavors regarding medical care in these two countries. Those already published include: Andersen, Anderson, and Smedby (1968), Anderson (1966), Anderson (1967), Anderson and Neuhauser (1969), Pearson, et al., (1968), Peterson, et al. (1967), Rosenfeld (1969). Another major publication concerned with international comparisons is currently being prepared by Odin Anderson. It will be a historical comparative analysis of the health services systems of Great Britain, Sweden and the United States. While the following report is an empirical analysis of social survey data, the Anderson volume will emphasize the relationship of the socio-political history of the countries to the structure assumed by their medical care systems. The author is drawing extensively on the related literature in each country, unpublished statistics and documents, personal interviews conducted with leaders in each country, and personal observations made over a period of several years of study and travel in each country. In addition, of course, the statistical findings of the comparative social surveys published in this report will be utilized. Anderson's study will be published as part of a series of books by Appleton-Century-Croft under the general editorship of David Mechanic. The expected publication date is 1971.

[2] While the present report is the first comparison of nationwide social surveys, with the objective of revealing some of the structural, demographic, social, and biological variables accounting for the striking differences in use, it is of interest to list the various types of studies that have appeared since 1958 to show that a cadre of other researchers is developing in several countries with various degrees of collaboration. The following references are divided into writings describing general characteristics of health services systems and those which begin to show patterns of use and expenditures as related to other characteristics of the countries considered.
(1) General Characteristics: Abel-Smith (1965), Field (1967), Follman (1963), Hogarth (1963), Mechanic (1968), Roemer (1963), Weinerman (1968).
(2) Patterns of Use and Expenditures: Abel-Smith (1967), Andersen and Hull (1969), Bice and Kalimo (1969), Bice and White (1969), Lembcke (1959), Logan (1968), Simpson et al. (1968), White et al. (1967), NCHS, Series 2, No. 23 (1969).

significant distinctions between highly developed countries although they may be useful for looking at ranges of variations within countries. Finally, we have no comparable clinical evaluations of the health of persons in the samples involved. Subjective patient evaluation of health and reports of conditions and symptoms, while valuable data, do not provide the objective base needed for comparing the well-being of different populations.

Thus, our aspirations are more limited. We want to study the influence of medical care systems on the use of health services. This is a measure related to the health of a population. By this we are not proposing that a higher actual use of health services in one population than in another indicates a better health level in the first one. It could, of course, be the other way round. The assumption is, however, that the provision of these services will have a positive effect on the health or, more generally, the well-being of the population although we will not be able to determine what weight to give to health services in relation to other factors which affect health indices.

Given this assumption, it becomes important to find out if differences in patterns of utilization exist between persons living under contrasting medical care systems. Differences that are found to exist might then be explained, at least in part, by the systems involved.

Our study was stimulated by evidence from other sources showing intriguing differences in use patterns between the United States and Sweden. For example, the mean number of physician visits per person per year appeared to be considerably higher in the United States than in Sweden. In contrast, average length of hospital stay was reported to be longer in Sweden even though the admission rates seemed to be similar in the two countries. These relationships are summarized in Table 1.

It is assumed that "objective" health levels of adults in Sweden and the United States are similar enough so that differences in utilization cannot be explained by the incidence of disease alone. Age-specific death rates are of comparable magnitudes although the United States tends to have somewhat higher rates.[3] In addition, the relative rankings of the most important causes of death show considerable similiarity at all ages. The conclusion to be drawn seems to be that it is becoming increasingly difficult to differentiate between the populations of technologically advanced, affluent countries such as Sweden and the United States using traditional measures for health levels.[4] Consequently, we believe that differences in

[3] Burgess et al. (1965).

[4] Peterson et al. (1967).

disease patterns cannot account for the considerable overall differences in medical care utilization that have been observed.

Our initial attempt to explain some of these differences using social survey data was primarily a social-psychological approach.[5] We postu-

TABLE 1

PRIOR EVIDENCE ABOUT THE RELATIVE USE OF PHYSICIANS AND HOSPITALS

Utilization	Sweden	U.S.
Mean number of physician visits per person per year.	2.7	5.3
Number of hospital admissions per 1,000 population per year:		
All hospitals.....	140	150
Short-term hospitals.....	127	134
Mean length of stay per hospital admission (in days):		
All hospitals.....	30.4	18.3
Short-term hospitals.....	12.5	7.7

Source: Peterson et al (1967).

lated that mean number of physician visits was higher in the United States than in Sweden because people in the former country would perceive more symptoms of illness and would be more likely to see a doctor for their symptoms. Our expectations were not supported, however, since Swedes reported more symptoms of illness and were no less likely than Americans to see a doctor for symptoms they experienced. The data did support another postulate, and this was that class and income variables would be more highly correlated with response to illness in the United States than in Sweden. We concluded in this earlier study that, in order to get a better understanding of differences in the magnitude of services delivered and of how these services are distributed among different kinds of people in a population, we would probably need to consider in more detail the effects of health service organization on utilization patterns.

We knew that the methods of organizing and financing health services and delivering medical care had important differences as well as similarities. The similarities seemed to provide some basis for making valid comparisons of utilization rates while the differences offered one avenue for explaining the contrasting use patterns described previously.

In this report we will develop a series of postulates concerning utiliza-

[5] Andersen, Anderson, and Smedby (1968).

tion of physicians, hospitals, drugs and dentists in Sweden and the United States. Some of these postulates will concern *overall* differences between the countries. Others will consider the relative importance of various criteria determining the distribution of services *within* each country. The former will be derived in part from a preliminary and tentative model for analyzing health services systems. The latter will be based on a behavioral model of health services use of individuals in addition to the systems model.

The postulates will be examined using data from comparative social surveys. Simple distributions and cross tabulations of the data will be used in the analysis as well as a multivariate technique designed to allow simultaneous comparison of several variables. Given the early stage of development of this field in general, the tentative nature of our models, and the methodological difficulties encountered, we do not claim that most postulates of the study are clearly proven or disproven by the results. We do hope, however, that the analysis gives us a clearer picture of utilization patterns in Sweden and the United States and a general frame of reference that can be utilized, altered, and expanded in later international comparative studies.

Our purpose is not to evaluate the total system nor to conclude that one system is "better" than another. Nor can we directly concern ourselves with the "quality" of a particular type of service in the different systems though we will attempt to make our units of service as comparable as possible. We have neither the means nor the criteria to make such judgments. Rather, our goal is to document the differences in use of services and to begin to study reasons for the differences that exist. We hope that these findings will encourage health care administrators to examine other systems for elements which might eventually be adapted to their own system to provide improved health services.

In order to keep the text clear and straightforward, the discussion of methodology and statistical techniques is limited. For the interested reader, the appendices contain more detailed consideration of sampling techniques, survey procedures, variable construction, and analytical methods.

CHAPTER II

A MODEL FOR COMPARING HEALTH SERVICES SYSTEMS

The national health care systems in Sweden and the United States are similar in some respects and different in others. The similarities, it might be argued, result because health services systems in Sweden and the United States have been shaped by much the same social, economic, and political systems and have responded to the same medical scientific forces. Consequently similar types of health personnel and health service facilities have emerged.[1] Hence, when we speak of personnel types such as physicans, dentists, nurses and pharmacists, we can, with minor variations, assume a working degree of similiarity among these two Western countries.[2] We can also assume a working degree of comparability when we speak of general hospitals, short-term hospitals, mental hospitals, and so on. We are then able to work out personnel and facilities ratios so that systems can be compared. Likewise, we can make reasonably valid comparison between systems by a common method of measuring the use of services such as hospital admission rates, length of stay, physician visits, dentist visits, units of medication administered, laboratory tests, and units of X-ray services.

However, while these countries have similar kinds of personnel, facilities, and services, the volume and organization of these components often differ considerably. In order to describe these differences and relate them to medical care utilization, a more explicit description of a "medical care system" and its components is necessary.

The health care system structures the provision of formal health care goods and services in a society. The definition of formal health care

[1] Anderson (1967).

[2] There are, of course, some exceptions, such as public health officers. These are primarily administrative personnel in the United States while in Sweden they also devote their time to providing medical care. Likewise, public health nurses play a much more important role in Sweden than in the United States both in preventive work and curative medicine. Also, the osteopathic doctors in the United States have no counterpart in Sweden.

goods and services is limited to physician care, hospital care, dental care, drugs, and health appliances and services provided by other health care practitioners. It does not include provision of sanitary services or other general public health measures; nor does it include provisions of necessities of life, which influence the state of health, such as food, clothing or shelter.

Informal health services such as care provided by the family of a patient should certainly be considered as having an influence on the amount of formal care provided by a doctor or hospital. Care by family and friends will not be considered directly in this study, however, since we do not have adequate means to measure it.

We will define the national health care systems as consisting of two major dimensions: resources and organization. Together they shape provision of services to the individual.

RESOURCES

The resources of the system are the labor and capital devoted to health care in each coutry. Included would be health personnel, structures in which health care and education are provided, and the equipment and materials used in providing health services.

In this study resources will be viewed as having two components which are thought to be particularly important for undertanding how people use medical care. One is the total volume of resources relative to the population served. The other is the way in which the resources are geographically distributed within a country.

Volume

The first component includes personnel-population ratios for various kinds of health-related occupations (including physicians, nurses, dentists, etc.) actively providing medical care. An alternative measure would be the man-hours of labor provided by the occupation rather than a simple count of active workers within it. Total amount of resources can also be measured by examining facilities which provide patient care. In this case bed-population ratios for hospitals of various kinds, nursing homes, and other institutions providing inpatient care are common measures.

The importance of volume of resources is based on the rather obvious assumption that, as the resource-population ratio increases, the medical care consumed by the population will also increase. Applying this concept to systems, the system with the higher resource-population ratio should have greater consumption per person of the related health care services.

While such an assumption might seem so self-evident as to hardly merit comment, it is made on the premise that all other dimensions of the system are "equal." In fact, medical care systems are complex, involving several dimensions in addition to absolute amounts of resources. These other dimensions are often not equal from one system to another. Further, as we will discuss later, there are other characteristics of a country apart from the medical care system which influence people's use of health services and which differ from country to country. Consequently, it is important to state the assumption explicitly and, when it is not borne out by the data, look for reasons why. Such a process can be most helpful in gaining insight into how various systems function and influence medical care use.

Distribution

The second component, geographical distribution, is important because the resources of the health system may not be homogeneously dispersed throughout the country. If such is the case, the resource-population ratio for the country as a whole will not reflect availability of medical services accurately for persons living in areas with either more or fewer health resources than the national average. The underlying premise here is that the health service system determines utilization patterns not only by the total resources it employs but also by the way these resources are spread throughout the country. With respect to overall utilization, we might expect greater dispersion of resources to result in increased utilization.

ORGANIZATION

"Organization" describes simply what the system does with its resources. It refers to the manner in which medical personnel and facilities are coordinated and controlled in the process of providing medical services. "Organization," like "resources," includes two components. These can best be summed up as "access" and "structure."

Access

"Access" refers to the means through which the patient gains entry to the medical care system and continues the treatment process. It specifies the requirements that must be met and the barriers which must be overcome before medical care is received. The degree of access in any system varies according to such things as direct out-of-pocket cost for medical care to the patient, the length of the queue for various kinds of treatments and general definitions concerning conditions which qualify the patient for treatment. Accessibility is assumed to increase as the pro-

portion of medical care expenditures paid for by the government, voluntary health insurance, or other third-party payers increases, as the waiting time for medical care decreases, and as the range of conditions accepted for treatment increases. Some organizational characteristics of the system which are considered to increase the level of access include "outreach" programs which carry medical care into the home, school, or place of work, availability of medical care 24 hours a day, and child care provisions when parents are receiving treatment.

Structure

"Structure," the second component of organization, deals with characteristics of the system that determine what happens to the patient following entry to the system. Of interest here are: the nature of medical practice of the primary practitioners who first see the patient in the system, the utilization of ancillary personnel, processes of referral to other sources of care, means of admission into the hospital, characteristics of hospital care, and disposition and care of patients following hospitalization. From a comparative standpoint it also seems important to examine the interrelation of facilities and personnel from system to system for possible influence on utilization patterns. For example, one might expect patterns of treatment to differ in some systematic fashion between two systems one of which has relatively more hospital beds while the other has more physicians.

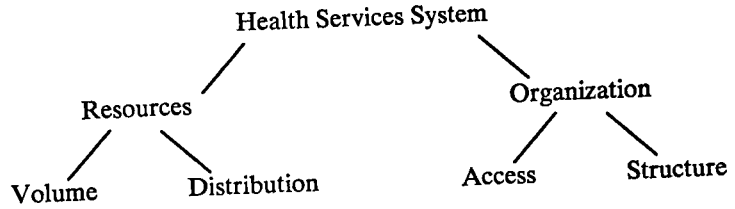
The structure component is the most difficult of the health services systems components to define as well as to relate to utilization patterns. The definitional problem results from the many facets of structure, only some of which are mentioned above. Also, the structure component is highly interrelated with the other components. Certainly, access as we have defined it depends in part on structure, and the structure of any system is dependent on the resources available to it.

The problem of relating organizational structure to use is both methodological and theoretical in origin. Methodologically, it is a major problem to study in detail the nature of a physician's practice or the internal workings of a hospital, and we have few models for such a task. The problem is, of course, magnified when international comparisons are involved. The study of structure is largely beyond social surveys of the kind this report is based on. Theoretical difficulties come in when we refer to the task of specifying how elements of structure determine ultimate utilization patterns. Again, there is very little to draw on in the way of either theory or empirical evidence.

Despite all these difficulties, it is essential to try to define the structural

component of the health services system and relate it to utilization patterns. Ultimately, the biggest payoff for both understanding one system and for making comparisons between systems will probably flow from knowledge of this structural component.

The dimensions of the health services system described above can then be illustrated as follows:



In the following section we will use this model and some information about the particular health care systems in Sweden and the United States to develop postulates about differences in overall use patterns between the two countries.

SYSTEM POSTULATES

In the following sections only a few of the myriad of possible postulates which could be derived are examined. Our choices are based on available information and the importance of the issue. Certainly we would hope that further specification of the model and collection of more detailed information will lead to elaboration of the efforts made here.

Resource Ratios

At the time this study was undertaken, the ratio of physicians to population was about 40 percent higher in the United States than in Sweden.

In contrast, Sweden had about 60 per cent more hospital beds for its population than did the United States. These gross rates, then, show quite sizable differences in the kinds of resources utilized in the two systems. We can roughly characterize the U.S. system as more "physician intensive" and that in Sweden as more "hospital intensive."

The other resource ratio we shall consider explicitly is that of dentists to population. Table 2 shows that Sweden had about 30 percent more dentists, again reflecting quite a sizable difference in resources. Based simply on the above information, without considering other factors that affect utilization rates, we would have the following expectation:

TABLE 2

HEALTH SERVICES RESOURCE-POPULATION RATIOS, 1963

Type of resource	Sweden	U.S.
Physicians per 100,000 population[a]	105	145
Hospital beds per 1,000 population[b]:		
All hospitals	14.0	9.0
Short-term hospitals	6.0	3.7
Dentists per 100,000 population[a]	74	56

[a] World Health Organization (1969). Calculated from Vol. I, Table 1, and Vol. III, Table 1.1.
[b] Peterson et al. (1967).

POSTULATE (*a*)

People in the United States will consume more physician services while those in Sweden will use more hospital and dental services.

Distribution of Resources

Both Sweden and the United States experience difficulties in providing physicians to rural areas. The data presented in Table 3 show that there are great differences in the physician-population ratios between urban and rural areas in both countries. Of course, the urban ratios in both countries are inflated by the fact that physicians engaged in activities not directly related to patients, such as administration, teaching, and research, are mainly found in the larger cities. Physicians in urban areas also provide medical care for the population of adjacent rural areas. This, in connection with the fact that the categories used for Sweden and the United States are somewhat different, makes a direct comparison of the figures difficult. It appears from Table 3, however, that the difference in the ratios between urban and rural areas is greater in Sweden.

POSTULATE (*b*)

More dispersion of physicians in the United States than in Sweden suggests that overall utilization rates should be higher in the United States than in Sweden if other factors are held constant.

Organization Access

In this analysis we will be primarily concerned with only one of the several facets of the "access" dimension—third party payment. Our

basic assumption is that access will vary directly with the proportion of medical care expenditure paid for by government, voluntary insurance or some source other than the patient or his family.

TABLE 3

DISTRIBUTION OF PHYSICIANS BY URBAN-RURAL LOCATION, 1962

LOCALITY	PHYSICIANS PER 100,000 PERSONS		PERCENT OF TOTAL POPULATION INCLUDED IN LOCALITY	
	Sweden[a]	U.S.[b]	Sweden[a]	U.S.[b]
Sweden				
Three largest cities	203		19	
Other cities and towns	151 } 169		33 } 52	
Rural district	26		48	
U.S.				
Greater metropolitan areas		205		36
Lesser metropolitan areas		153		30
Areas adjacent to metropolitan areas		92		16
Isolated semi-rural areas		100		15
Isolated rural areas		59		3

[a] Medicinalstyrelsen (1964, p. 61); Statistiska Centralbyrån (1965, p. 9).
[b] Pennell and Baker (1965, pp. 13, 32).

Hospital services in Sweden are financed almost entirely by the local county governments and the major municipalities. Except for special accommodations, hospital care is provided at practically no direct cost to the patient. Patients are reimbursed by compulsory health insurance for charges for out-patient physician services and prescribed drugs. When our study was conducted, this reimbursement approached two-thirds of total gross physician costs and slightly less than half of total prescribed drug costs.[3]

In contrast, in the United States in 1963 almost one-fifth of the total expenditure for short term hospital services was paid for directly by the consumer. The remaining expenditure for hospital services was divided about equally between government and voluntary health insurance. Patients and their families paid directly for about three-fifths of the

[3] Riksförsäkringsverket (1965, p. 85), Smedby (1966, pp. 191 192).

physician services they used. Insurance covered one-third of physician charges, leaving a small fraction covered by the government. Consumers paid directly for almost all of the drugs they used in the United States.[4]

Thus, out-of-pocket costs to the consumer of health services in Sweden were in 1963, and still are, considerably less than costs to the U.S. consumer.[5] The only exception is dental care for adults. While services for children are provided free through the Swedish public dental service, dental care for most adults in Sweden and for all persons in the United States is largely paid for directly by the consumer.[6] These comparative findings are summarized in Table 4.

POSTULATE (*c*)

Since degree of access defined in terms of third party payment is greater in Sweden for physician and hospital services and drugs, we would expect higher utilization of these services in Sweden.[7] Since dental care for adults is not financed by a third party to a notable degree in either country, similar patterns are expected.

Organization Structure

The several postulates which follow concerning how structural differences in the systems of medical care in Sweden and the United States might affect utilization were stimulated by prior knowledge of utilization patterns from other sources (see Table 1) as well as by the systems model. As indicated in the Introduction, this is by far the most complex dimension of the health system, and logical expectations concerning its

[4] Reed and Hanft (1966, derived from p. 14).

[5] Since these data were collected, the proportion of payment for personal health services met by direct consumer payment has decreased considerably in the United States. In 1963 consumers paid directly 52.5 percent of the expenditures for personal health services in the United States (Reed and Hanft, 1966, p. 13).
For the fiscal year 1969 this percentage had dropped to 40.6. Most of this reduction has taken place since 1965 with the introduction of Medicare and Medicaid which considerably increased government expenditures (Cooper, 1969, Table 4).

[6] The public dental service in Sweden also provides dental care to adults at a reduced price. Because of the concentration on children, however, only a limited number of adults are treated. Reimbursement from the compulsory health insurance is only given for certain kinds of specialist care and for dental care to pregnant and recently delivered women.

[7] It should be noted that this postulate concerning utilization of physician services is opposite to that presented in the section on resources which suggested that physician utilization would be higher in the United States. This contrast is not necessarily illogical. Comparisons on different dimensions of the systems can lead to different expectations about utilization patterns since each is made assuming "other things being equal." When contrasting postulates are derived, the results give some indication of which dimension has more impact on medical care use.

effects on utilization based on the present model alone are difficult to develop.

With the prior knowledge that mean number of physician visits is higher in the United States than in Sweden, we began to consider the structural aspects of each system to see if some more detailed explanation could be offered than the simple resource explanation that there are more physicians in the United States. A possible structural reason for the

TABLE 4

PROPORTION OF EXPENDITURES FOR PERSONAL HEALTH SERVICES NOT PAID FOR DIRECTLY BY THE CONSUMER[a]

Type of Service	Sweden	U.S.
Short-term hospital	All	4/5
Physician	2/3	2/5
Prescribed drugs	1/2	Practically none
Dental services	Practically none for adults. All for children	Practically none

[a] See text for explanations and sources.

difference is that other types of contacts are substituted for physician care in Sweden. The Swedish system includes among its personnel public health nurses with functions also in curative medical care and midwives working in prenatal care. These two groups of paramedical personnel perform patient care functions usually restricted to physicians in the United States.

POSTULATE (*d*)

Since nurses perform more patient care functions in Sweden than in the United States, the utilization rates combining nurse and doctor visits will be more similar between the two countries than the doctor visit rates alone.

The patient's primary physician is likely to be the attending physician in the hospital in the United States,[8] but this is rarely true in Sweden. In

[8] A study of a representative sample of hospitalized patients in the state of Massachusetts showed that 72 percent of the patients had the same recommending and attending physician. There is no particular reason to suppose that the situation in Massachusetts is atypical of that for the country as a whole. Further, it should be noted that obstetrical admissions were not included in the study and the probability of the recommending physician being the attending physician for these cases is even higher than for other kinds of admissions. (Anderson and Sheatsley, 1967, p. 67.)

Sweden responsibility is generally shifted to a hospital-based physician when a patient is admitted to a hospital. The shift of responsibility for the inpatient is one means of equalizing the patient load between the primary physician and the hospital consultant.[9]

This shift of responsibility provides one tentative explanation for fewer physician visits and longer lengths of hospital stay in Sweden. Since the attending physician in a Swedish hospital does not generally treat his patient before hospitalization, the prehospital work-up in the United States represented by physician visits may become part of the hospital stay in Sweden. Further, the consultant in Sweden might be more reluctant to discharge his patient than the attending United States physician because the Swedish patient is no longer the consultant's responsibility after discharge. Again, the result would be hospital care in Sweden substituting for physician services in the United States.

POSTULATE (*e*)

Average length of stay in Swedish hospitals may be greater than in U.S. hospitals because people who are hospitalized in Sweden get a greater proportion of the total medical care they receive in the hospital than do inpatients in the United States.

Another possible reason for longer length of stay in Sweden can be gleaned from observing personnel-bed ratios in hospitals in the two countries. In 1963, the number of full time hospital personnel other than physicians was 2.41 per bed in short-term, non-psychiatric hospitals in the United States compared to 1.38 in Sweden.[10]

A final postulate related to the structure of the system concerns drug use. While patients in Sweden are reimbursed for prescribed drugs, they are not reimbursed for non-prescribed medicines. Thus there is a financial incentive for them to ask their doctors to prescribe medicines for less serious conditions which would be purchased directly by patients in the United States where there is no financial incentive to ask for a prescription. Therefore, Swedish doctors may prescribe items which could be purchased without a prescription to a greater extent in order to minimize direct costs to their patients.

[9] For a general discussion on the differences between Sweden and the United States regarding the physician's relationship to hospitals see Anderson (1966), Anderson (1967), and Peterson et al. (1967).

[10] Peterson et al. (1967). This personnel ratio could be regarded as one measure of the intensity of care given in the hospital. Only for certain kinds of cases does the biological course of events constitute the logical base for the length of stay. In other cases, such as admissions for investigation and some treatments, the availability of personnel may influence the length of stay. A lower density of personnel may lead to delays in what has to be done to the patient. The total period necessary to attain a certain result would then be longer in a system with less personnel. Thus, shorter lengths of stay would be expected in the United States.

POSTULATE (*f*)

Use of prescribed drugs will be higher in Sweden than in the United States because some medicines purchased directly by the patient in the United States are prescribed by physicians in Sweden.

Table 5 provides a summary of the postulates developed in this chapter. The following chapter presents evidence from our social survey bearing on these hypotheses.

TABLE 5

POSTULATES CONCERNING EFFECTS OF HEALTH SERVICES SYSTEMS ON OVERALL UTILIZATION

TYPE OF UTILIZATION	RESOURCES		ORGANIZATION	
	Volume	Distribution	Access	Structure
Physician	Higher use in the U.S. (a)	Higher use in the U.S. (b)	Higher use in Sweden (c)	Combining nurse visits and physician visits will make use more similar (d) More outpatient care in the U.S. for hospitalized patients than in Sweden (e)
Hospital	Higher use in Sweden (a)		Higher use in Sweden (c)	Longer lengths of stay in Sweden (e)
Prescribed drugs			Higher use in Sweden (c)	Higher use in Sweden (f)
Dental	Higher use in Sweden (a)		Similar use for adults (c)	

The letters in parentheses refer to the postulate designation in the text.

CHAPTER III

OVERALL DIFFERENCES IN MEDICAL CARE UTILIZATION

In this chapter we will examine overall differences in utilization between Sweden and the United States according to the results of comparable social surveys conducted in each country.[1] One purpose of the chapter is to report whether, using methods as comparable as possible, prior evidence concerning the differences in use patterns between the two countries is borne out by our findings. A second purpose is to present data on other differences which have not been previously documented. Finally, the postulates developed in the last chapter concerning system effects on utilization will be employed in an attempt to understand some possible reasons for the observed differences:

Postulate (*a*) People in the United States will consume more physician services while those in Sweden will use more hospital and dental services.

Postulate (*b*) More dispersion of physicians in the United States than in Sweden suggests that overall utilization rates should be higher in the United States than in Sweden if other factors are held constant.

Postulate (*c*) Since degree of access defined in terms of third party payment is greater in Sweden for physician and hospital services and drugs, we would expect higher utilization of these services in Sweden. Since dental care for adults is not financed by a third party to a notable degree in either country, similar patterns are expected.

Postulate (*d*) Since nurses perform more patient care functions in Sweden than in the United States, the utilization rates combining nurse and doctor visits will be more similar between the two countries than the doctor visit rates alone.

Postulate (*e*) Average length of stay in Swedish hospitals may be greater than in U.S. hospitals because people who are hospitalized in Sweden get a greater proportion of the total medical care they receive in the hospital than do inpatients in the United States.

[1] See Appendix A for a description of the sampling technique and methods used in these studies.

Postulate (*f*) Use of prescribed drugs will be higher in Sweden than in the United States because some medicines purchased directly by the patient in the United States are prescribed by physicians in Sweden.

The chapter is divided according to the major types of utilization considered in the study: physician, hospital, prescribed drugs, and dental.

PHYSICIAN UTILIZATION

Prior documentation and postulates (*a*) and (*b*)—based on the volume and distribution of resources—led us to expect greater consumption of physician services in the United States. In contrast, postulate (*c*), based on access to the system, suggested that utilization of physicians should be greater in Sweden. Our surveys show in fact that the proportion of people who see a doctor at least once during a year is similar—about two-thirds—in both countries (Table 6). Earlier evidence from other sources concerned only mean number of visits and not percent seeing a doctor within a given time period (see Table 1). Our findings suggest that even though the two systems differ considerably, with the United States having more doctors and Sweden fewer economic barriers to seeing the doctor, the net effect measured by the probability of seeing a doctor at least once within a year is about the same. Thus the contrasting postulates (*a*) and (*c*) may in fact both be valid with the predicted differences in use tending to cancel each other out.

TABLE 6

USE OF PHYSICIANS

Measure of use	Sweden	U.S.
Proportion of population seeing a physician at least once during 1963 (percent)	69.1	64.5
Mean number of physician visits during 1963 per person who saw a physician	3.6	6.2

Another measure of physician utilization shows more substantial differences between the countries. Those Americans who do see a doctor average 6.2 visits per year compared to 3.6 visits for Swedish patients according to Table 6. This finding of about 70 percent more visits by American patients is in accord with postulate (*a*) but not with postulate (*c*). It suggests that once a patient enters the system the volume of services he receives is more a function of the resources the system employs than of

its accessibility. Hence patients in a system with more doctors have more physician visits.

Postulate (*d*) provided one reason for the apparent difference in mean physician visits between the two countries, suggesting that nurse visits in Sweden were substituting for doctor visits in the United States. Table 7 allows us to examine this possibility by showing a breakdown of the various kinds of physician-nurse contacts that persons have with the health care system in each country. Our data allow such a breakdown only for persons aged 16 and over. The means refer to all persons 16 and over—not only to those with contacts.

TABLE 7

PHYSICIAN AND NURSE CONTACTS BY TYPE

TYPE OF CONTACT	MEAN CONTACTS PER PERSON[a] PER YEAR	
	Sweden	U.S.
Physician in office and clinic	2.62	4.45
Physician in patient's home	.08 } 2.70	.22 } 4.67
Nurse in a physician's office	.46	.43
Public health nurse	.38	....
Telephone call to physician	.45	.37[b]
Total contacts	3.99	5.47

[a] Includes persons 16 and over only.
[b] Derived from NCHS (1965, Series 10, No. 18, pp. 23–27).

Here we see that, as expected, the number of face to face contacts between patient and doctor in the office, clinic, or home is considerably higher in the United States. Visits to a doctor's office during which the doctor was not seen but treatment was provided by his nurses or other assistants are similar in the two countries. Public health nurse visits account for a significant number of medical contacts in Sweden but were negligible in the United States. Finally, although telephone consultations with a doctor may also substitute for face to face contacts, Table 7 shows that telephone contacts were only slightly more frequent in Sweden.

Our evidence, then, is that public health nurse visits do reduce the overall difference in medical contacts somewhat while use of the telephone contributes very little to the reduction. After all these differences are taken into account, total medical contacts remain considerably higher in the United States than in Sweden. For face to face physician contacts only, the difference is 2.0 contacts. For all types of contacts the difference

is still 1.5 contacts. Thus, postulate (*d*) provides some of the answer for the difference in mean physician visits but not all of it.

Another possible reason for more physician visits in the United States, as suggested in postulate (*e*), has to do with hospitalized persons. The basic premise is that part of the care which is provided prior to and following hospitalization in the United States is provided in the hospital in Sweden. Some support for this premise would be found if it could be shown that persons hospitalized at least once during the year get *more* outpatient care in comparison with non-hospitalized patients in the United States than they do in Sweden.

Table 8 shows that, in fact, the ratio of the means of outpatient physician visits of hospitalized to non-hospitalized persons is 2.9 in the United States compared to 2.1 in Sweden. Further, if we compare these ratios for subgroups defined according to age and sex we find the U.S. ratio higher in *each* case.

TABLE 8

A COMPARISON OF THE MEAN NUMBER OF OUTPATIENT VISITS FOR HOSPITALIZED AND NON-HOSPITALIZED PERSONS

CATEGORY	SWEDEN				U.S.			
	(1) All persons	(2) Hospitalized persons	(3) Non-hospitalized persons	(4) Ratio (col. 2/ col. 3)	(5) All persons	(6) Hospitalized persons	(7) Non-hospitalized persons	(8) Ratio (col. 6/ col. 7)
All persons	2.5	4.9	2.3	2.1	4.0	10.0	3.5	2.9
Sex								
Male	2.3	4.1	2.1	2.0	3.4	9.3	2.9	3.2
Female	2.8	5.6	2.5	2.2	4.6	10.6	4.1	2.6
Age								
0–15	1.9	3.2	1.8	1.8	2.7	5.2	2.5	2.1
16–44	2.6	4.5	2.4	1.9	4.6	11.0	3.8	2.9
45–64	2.9	6.5	2.5	2.6	4.8	12.0	3.9	3.1
65 and over	2.8	4.4	2.6	1.7	5.7	11.3	4.9	2.3

While this is evidence of outpatient care being replaced by inpatient care in Sweden, this process has little influence on the overall difference in mean number of physician visits between Sweden and the United States. Thus, even if the number of outpatient visits for hospitalized persons was increased in Sweden so that the ratio (column 4 of Table 8) became equal to the U.S. ratio, the estimate for all persons of mean number of outpatient visits for Sweden would increase only two-tenths of a visit

from 2.5 to 2.7.[2] This mean number is, of course, still considerably lower than the comparable figure of 4.0 in the United States.

HOSPITAL UTILIZATION

Other sources have shown admission rates to be similar in the United States and Sweden. Length of stay, however, is considerably longer in Sweden.[3] Postulates (*a*) and (*c*) do not differentiate between fact of utilization and amount of utilization and suggest both higher probability of admission and more days spent in the hospital in Sweden. These expectations are based on the greater number of beds in Sweden and absence of any direct costs to the patient for hospital care.

We have chosen measures to present findings on hospital utilization from our study which differ somewhat from traditional measures. Instead of admission rates we have calculated the proportion of the population in the two countries admitted to a hospital at least once during a year. Mean number of days spent in the hospital during the year by those people admitted, regardless of the number of admissions per patient, is substituted for the more usual measure of the average length of stay per admission. In this way we can eliminate the influence of a possible difference in readmission policy. Furthermore, our data include both short-term and long-term hospital care but exclude obstetrics and care in connection with pregnancy complications. Still, our data, reported in Table 9, generally correspond with those reported in other sources. The proportion of the population admitted to the hospital sometime during the year is similar in the two countries. The mean number of days spent in the hospital by those people admitted at least once is considerably higher in Sweden.[4]

The findings concerning hospital days are, then, quite in accord with our postulates based on higher volume of resources and greater accessi-

[2] Calculated as follows:

$$\begin{pmatrix}\text{Percent non-hospitalized Swedes}\end{pmatrix}\begin{pmatrix}\text{Mean number of visits for non-hospitalized Swedes}\end{pmatrix} + \begin{pmatrix}\text{Percent hospitalized Swedes}\end{pmatrix}$$

$$\begin{pmatrix}\text{Mean number of visits for non-hospitalized Swedes}\end{pmatrix}\begin{pmatrix}\text{U.S. ratio}\end{pmatrix} = (.915)(2.3)+(.085)(2.3)(2.9)=2.7$$

[3] See Table 1.

[4] We chose our measures to maximize comparability between the two countries. Owing to difficulties in getting comparability in definitions of what is a hospital, however, there may be some bias toward more days in Sweden because long-term care in nursing homes is included in hospital care in Sweden.

bility in Sweden. However, we must probe the systems in more detail to understand the relatively similar number of people entering the hospital in the two countries. One factor may be the relatively large physician population ratio in the United States. Since the doctor determines the flow of patients into the hospital, and the majority of primary doctors have hospital appointments in the U.S. system, the overall effect may be to

TABLE 9

USE OF HOSPITALS

Measure of use	Sweden	U.S.
Proportion of population with hospital care during 1963 (percent)[a]	8.5	8.0
Mean number of hospital days during 1963 per person with at least one spell of hospital care[a]	24.3	14.5
Mean number of outpatient visits during 1963 per person with at least one spell of hospital care[a]	4.9	10.0

[a] Excluding hospital care for obstetrics and pregnancy disorders.

stimulate admission more than in a system with fewer physicians, a smaller proportion of whom can admit patients directly into the hospital. Finally, the present voluntary insurance benefit structure in the United States would seem to encourage hospital admissions since treatment given in the hospital is much more likely to be paid for than treatment provided out of the hospital.[5]

An alternative postulate has been offered which suggests how *structural* differences might explain patients' spending more days in the hospital in Sweden. It is that, in Sweden, hospital care replaces care given on an outpatient basis in the United States (postulate *e*).

If the substitution effect is indeed taking place, we would expect to find a marked difference in the relationship of physician visits to hospital days for hospitalized individuals between Sweden and the United States. Table 9 shows such a difference, in that hospitalized individuals in Sweden on the average use about 70 percent more hospital days than those in the United States. Conversely, people hospitalized at least once in the United States see the doctor about twice as often as their counterparts in Sweden.

[5] A representative social survey of hospitalized patients and their doctors in the state of Massachusetts found 6 percent of both patients and doctors reporting that the patient would not have gone to the hospital if he had not been covered by insurance (Anderson and Sheatsley, 1967, pp. 61, 104).

Part of this difference in physician use by hospitalized people should not be considered a substitution effect, since the population as a whole has a higher number of average visits in the United States. However, even if we control for the generally higher use of physicians in the United States, the estimated mean number of visits for U.S. patients hospitalized at least once is still 6.3, a third higher than the mean use by hospitalized persons in Sweden.[6]

Thus, there seems to be good indication that a substitution effect does account for some of the differences in number of hospital days utilized by patients in Sweden and the United States. We have suggested that this effect helps to shift the patient load from the primary physician to the hospital physician in Sweden and also allows the latter to follow his patient longer than he could in a system with shorter lengths of stay.

USE OF PRESCRIBED DRUGS

Postulate (c) suggested that since costs for prescribed drugs are covered in large part in Sweden but not in the United States, use would be greater in Sweden. Table 10 does show that a substantially greater portion of Swedes than Americans used prescribed drugs during the survey year.[7]

Postulate (f) infers that the benefit structure in Sweden encourages prescriptions for medicines bought without prescription in the United States. The inference here is that the drug use differences between the two countries might be more apparent than real. One way to examine the latter possibility is to differentiate people according to their health level. If drugs are being prescribed in Sweden for less serious conditions for which people could purchase medicine directly, then the difference between the proportion of people in Sweden using prescribed drugs and those in the United States using prescribed drugs should be greater for those in good health than for those in poor health.

Swedes of each health level are more likely to use prescribed drugs

[6] Calculated as follows:

$$\left(\frac{\text{Mean number of outpatient visits for all persons in Sweden}}{\text{Mean number of outpatient visits for all persons in the U.S.}}\right) \times \left(\text{Mean number of outpatient visits for hospitalized persons in the U.S.}\right)$$

$$= \frac{2.5\,(10.0)}{4.0} = 6.3.$$

[7] The variable "use of prescribed drugs" is based on both interview data and prescription data in Sweden but on interview data alone in the United States. This methodological difference results in some bias toward higher figures for Sweden. Eight percent of all Swedes were identified as users by record data although they did not report this use in the interview.

than are Americans of corresponding health level according to Table 10.[8] However, the relative difference between the countries is twice as great for persons in the best health category as for those in poorest health. These findings then suggest that prescriptions may be given for less serious conditions in Sweden. Postulate (f) proposes that this results from

TABLE 10

USE OF PRESCRIBED DRUGS DURING THE YEAR ACCORDING TO HEALTH LEVEL

HEALTH LEVEL[a]	PERCENT USING PRESCRIBED DRUGS		RELATIVE DIFFERENCE[b]
	Sweden	U.S.	
All persons[c]	62	45	38
High	37	24	54
Middle	69	52	33
Low	94	74	27

[a] For definition of health levels see footnote 8 to this chapter.

[b] Difference between the Swedish and the U.S. percentage figures expressed as a percentage of the U.S. figure.

[c] For persons 21 and over only.

an economic incentive for the Swedish patient to ask for prescribed drugs rather than purchase non-prescribed medicines. An alternative reason for the differences might be different legal codes concerning what medicines must be prescribed. We have no evidence, however, that this is the case. Finally, Swedes in good health may actually use relatively more prescribed medicine. Still, our findings correspond with the original postulate and thus remain viable for further testing.

DENTAL CARE UTILIZATION

Given the higher dentist-population ratio in Sweden, higher utilization would be expected in Sweden according to postulate (a). Since our study

[8] Two variables were used in this study to measure perceived health level: number of symptoms reported from a checklist and a general rating by the respondents of their health during 1963. The latter variable was grouped differently in the two questionnaires (cf. footnote 1 in Chapter VII, p. 74, and Appendix B). In order to arrive at similar distributions in the two countries a combination of the two variables has been used for the grouping according to health level presented in Table 10. The "high" level includes persons who reported good health and no symptoms in Sweden or excellent health and no symptoms in the United States. It comprises 26 percent (weighted) of the Swedish respondents and 21 percent of the U.S. sample. In both countries the "low" level includes persons who reported poor health, regardless of number of symptoms. This group corresponds to six percent of the sample in both countries. The "middle" level includes all other persons.

of dental care is limited to adults and the cost of dental care is generally not paid for by third parties in either country, differences were not expected according to the access postulate (c).

The observed proportions of persons 16 and over using dental care were actually quite similar as shown below:

Percent seeing a dentist during 1963	
Sweden	U.S.
43.1	40.1

This finding might be expected, given the lack of significant reimbursement for dental expenses in either country (postulate c). However, it is somewhat unexpected given the fact that there are proportionately more dentists in Sweden. One explanation flows from the differences in dental care patterns for children. All Swedish children are entitled to free dental

TABLE 11

FINDINGS CONCERNING POSTULATES ABOUT DIFFERENTIAL EFFECTS OF SYSTEMS ON HEALTH SERVICE UTILIZATION

TYPE OF UTILIZATION	DIMENSION OF SYSTEM			
	Resources		Organization	
	Volume	Distribution	Access	Structure
	Country in which utilization was expected to be higher according to postulate			
Physician..	(a)—U.S.: Supported for number of visits but not fact of visit	(b)—U.S.: Supported for number of visits but not fact of visit	(c)—Sweden: Not Supported	(d)—U.S.: Partly Supported (e)—U.S.: Not Supported
Hospital...	(a)—Sweden: Supported for number of days but not fact of admission	.....	(c)—Sweden: Supported for number of days but not fact of admission	(e)—Sweden: Partly Supported
Prescribed Drugs...	.....	.....	(c)—Sweden: Supported	(f)—Sweden: Partly Supported
Dental Care....	(a)—Sweden: Not Supported	.....	(c)—No Difference: Supported	.....

The letters in parentheses refer to the postulate designation in the text.

care through the public dental service, mainly through organized school dental services. Among Swedish school children age 7 through 15 years, 84 percent received complete dental care in 1962. In addition, some school children obtained partial care.[9] Contrasting to this, among U.S. children age 6 through 17, less than half saw a dentist in 1963.[10] Thus the additional dental personnel in Sweden may be largely involved in caring for children.

SUMMARY

In this chapter we have been concerned with the effects of the health service system on overall utilization patterns in Sweden and the United States. To aid our understanding of differences between the countries a number of postulates from our general model for comparing health services systems were examined. While our findings do not provide the kind of evidence needed to reject or conclusively verify these postulates outright, they do provide supporting data for some postulates and non-supporting findings for other postulates. By way of summary, Table 11 shows the pattern of our findings with respect to all of the postulates examined.

Up to this point we have been concerned with the total amount of services provided by the system. In the following chapters we will turn to the question of how services are distributed among the population using each system.

[9] Sjukförsäkringsutredningen (1966, p. 33).

[10] Andersen and Anderson (1967, p. 46).

CHAPTER IV

A BEHAVIORAL MODEL OF HEALTH SERVICES USE

In addition to overall system differences, we are interested in how the system interacts with other characteristics of people in the two countries to determine the health care they receive. For example, do old people receive more care relative to young people in one country than in the other? Or is income a more important determinant of medical care consumption in one type of system than in another? In order to examine these differences in a systematic manner, individual family and community characteristics must be related to use of health services. The basic question to be answered is in what ways do the criteria for distributing medical care differ within systems?

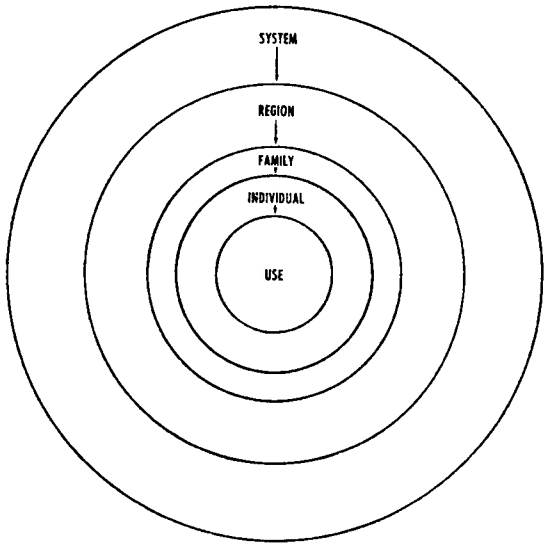
The overall analysis might then be viewed as a consideration of several levels of variables which, together, are expected to shape utilization patterns. These levels are graphically displayed in Chart 1.

In order to perform such an analysis, we need, in addition to the general systems model, a model which gives some indication of the kind and relationship of variables—other than systems variables—which influence the medical care an individual receives. This model should guide us in the selection of relevant variables to include in the analysis. It should also, together with the systems model, suggest postulates concerning the differing impact of these variables from one system to another.

The purpose of this chapter is to describe one attempt at such a behavioral model of health service utilization. Further, it specifies the particular variables to be included in the model. Finally, some postulates about expected differences between Sweden and the United States will be presented. These postulates are generated from the behavioral model, the systems model, and certain other basic assumptions about the overall social system of Sweden and of the United States. Much of the remainder of the report will be guided by these postulates.

CHART 1

DIMENSIONS OF A MODEL TO COMPARE MEDICAL CARE UTILIZATION FROM ONE SYSTEM TO ANOTHER



THE MODEL

The basic model employed here was first developed to study utilization patterns within one country.[1] There, the major question concerned the relative impact of different kinds of variables within a given system. However, with minor alterations, we assume the same model can be applied to study how certain kinds of variables differ in their effect on use patterns from one system to another. In addition, it will be of value to observe under what conditions people behave in a similar fashion even though they live under different systems.

Another difference between the use of the model here and its original purpose concerns the unit of observation. In the national study the unit of observation was the family unit while here it will be the individual. A study of family units was not possible in this report because the Swedish sample consisted of individuals rather than of households. Thus complete information was not collected on all family members. There are, of course, advantages and disadvantages to using either unit.[2] In the following analysis we have attempted to take into account some important

[1] See Andersen (1968). [2] Ibid., pp. 5–8, 14, 56.

influences of the family by ascribing family characteristics such as family size, family income and social class of the family head to the individual in the analysis. This discussion then implies an assumption on our part that the model is flexible enough to apply to individual as well as to family analysis, given minor alteration in form and modification of the variables included.

Our underlying model assumes that a sequence of conditions contributes to the volume of health services a person uses in each country. Use is dependent on: (1) the "predisposition" of the individual to use services; (2) his ability to secure services; and (3) his perceived illness.

Predisposing Variables

Some individuals have a propensity to use more services than other individuals. This propensity toward use can be predicted by individual characteristics which exist prior to the onset of specific episodes of illness. People with certain of these characteristics are more likely to use health services even though the characteristics are not directly responsible for health service use. Such characteristics include demographic and social structural variables.

Age and sex, for instance, are intimately related to health and illness. However, they are still considered to be predisposing conditions. Age is not in itself considered 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 social structural variables reflect the location of an individual in his society as measured by characteristics such as education and social class determined by occupation of the family head. These characteristics suggest what the life style of the individual may be. They point to the physical as well as the social environment of the individual and associated behavior patterns which may be related to his use of health services. In addition they are sometimes related to (1) attitudes and values concerning health service use and (2) knowledge about illness and health practices and procedures used to cope with illness in the family.

Enabling Characteristics

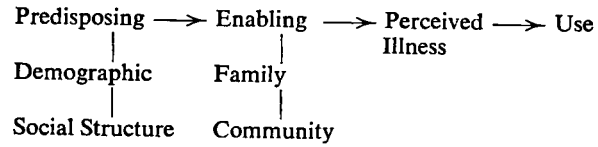
Even though an individual may be predisposed to use health services, some means must be available for him to do so. A condition which permits an individual to act upon a value or satisfy a need regarding health service use is defined as enabling.[3] Enabling conditions make health services available to the individual. Availability includes family means for attaining services, such as income or health insurance, and geographic accessibility to services, both of which must be present in some form for services to be used.

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

Perceived Illness

Assuming the presence of predisposing and enabling conditions, the individual or his family must perceive illness or the possibility of illness for use of services to take place in a voluntary system. The measures of illness used in this study are self-reports of certain symptoms and general health level. These are less than optimal measures. They measure a different phenomenon than is measured by a clinical examination, but there is still considerable correlation between the two.[4] Thus, the measures we have used represent primarily what people think but, in part also, diseases which could be clinically diagnosed.[5]

The basic model, including its main components and subcomponents, might then be diagrammed as follows:



In the following section we will discuss the variables chosen in this study to represent each component.

THE VARIABLES

The variables were chosen for the analysis because of their correspondence to the model, because previous research had related them to health service use, and because measures comparable enough for our purposes could be devised from the data collected in Sweden and the United States. Not all of the most relevant variables will be considered. We lack knowledge, ability to operationalize, and study resources for such a task. However, we do assume that those selected give us a reasonable opportunity to apply the model and add something to our limited knowledge about health and illness behavior in Sweden and the United States.

Predisposing—Demographic

The variables here are age, sex, and marital status of the individual.

[4] The meanings of responses to health questionnaires are discussed by Croog (1961); Scotch (1963–1964); Abramson (1966); and Feldman (1966).

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

Age and sex are included primarily because they are indicators of the physiological state of the individual which is associated with his health level and use of health services.[6] In fact, age and sex are sometimes used in studies like this as proxy measures of illness.

Some quite definite patterns have been established between age and use of services. Use of most health services increases with age of the individual.[7] Major exceptions to this are: (1) high use of physician services by young children relative to older children;[8] (2) the high use of hospital and physician services by females during the reproductive years;[9] and (3) the declining use of dental services by older people. [10]

Females generally use more services than males.[11] Only hospital use, among the major services, shows deviations.[12] 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 in reproductive ages.[13]

Because of the high proportion of female hospitalizations for deliveries and physician visits for prenatal care, marital status is a salient variable for predicting health service use among young women. However, there are other interesting differences in age adjusted utilization patterns according to marital status. Persons who have never married have fewer hospital admissions while those married tend to have shorter lengths of stay.[14] The never married also report fewer physician visits and less use of prescribed drugs.[15] In contrast, the never married had the most dental visits while persons widowed, divorced, or separated visited the dentist least.[16]

[6] See, for example, Wirick (1966). This use of the variables does not exclude their significance as indicators of social role and status which can influence various types of behavior. See Linton (1942). However, in studies of health and illness behavior their biological significance seems to be predominant.

[7] Confrey and Goldstein (1960); Youmans (1961); Läkarprognosutredningen (1961, pp. 73–74); Lawrence (1964); Ellenbogen et al. (1964); Health Information Foundation (1965, No. 6); Health Information Foundation (1966, No. 3); Royle and Brewster (1966).

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

[9] NCHS (1965, Series 10, No. 18, p. 14); NCHS (1966, Series 10, No. 30, p. 17); Smedby (1968, p. 193); Socialstyrelsen (1969, pp. 14–24).

[10] NCHS (1965, Series 10, No. 23, p. 11); Smedby (1965, p. 177).

[11] NCHS (1965, Series 10, No. 18, pp. 3–4); NCHS (1965, Series 10, No. 23, p. 16); Smedby (1966, p. 186); Health Information Foundation (1966, No. 3); NCHS (1966, Series 10, No. 33, p. 14); Riksförsäkringsverket (1968, p. 53).

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

[13] NCHS (1966, Series 10, No. 30, pp. 5–7, 16); Socialstyrelsen (1969, pp. 17, 21).

[14] NCHS (1969, Series 10, No. 50, p. 11).

[15] Smedby (1966, p. 184); NCHS (1968, Series 10, No. 49, pp. 7–8).

Predisposing—Social Structure

The social structural variables used in the analysis include family size, social class of the family head, education, and race. Family size might also be considered as a "demographic" variable. However, since the demographic variables, age and sex, are considered in the model primarily as indicators of physiological condition, it seemed appropriate to include family size as a social structural variable since much of its impact on medical care utilization seems to reflect more a predisposition due to life style.

Individuals from large families seem to use fewer services than those in smaller ones.[17] This trend seems to remain even after age and economic circumstances are taken into account. It may reflect, particularly for children, the smaller total attention that can be devoted to the health needs of any one person as family size increases. In addition the parents may feel capable of coping with certain illnesses of later children which would have caused them to consult a doctor with their first born. Finally, large families are better able to substitute home services for the services of the formal medical care system. For instance, it is more likely that other family members are available to provide nursing care to a convalescent member in a large family.

Social class in this study is based on the occupational rank of the family head. Occupation is ranked along a continuum of professionalization or skill. The measure is included to get at the family's standard of living. Families having main earners with a more skilled occupation generally have a life style that results in greater use of health services.[18] Even though lower social classes might in fact have more "objective" illness due to adverse environmental conditions, a higher threshold of perceived

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

[17] 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. See NCHS (1967, Series 3, No. 7, pp. 7–8). Thus, while members of large families use fewer health services, the amount of illness they experience may, in fact, be greater.

[18] 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); Smedby (1965, pp. 173–179); Suchman (1965, (1), pp. 1725–1733); Bedger (1966, pp. 829–833); Ireland, ed. (1966); Solon (1966, pp. 884–894).

need and economic barriers can result in less use of services. Farmers are excluded from the social class variable because of their special characteristics and the difficulty in placing them along a social class continuum. Instead, we have included a farm/non-farm variable.

The literature generally shows a direct relation between level of education and amount of health services used.[19] Several reasons are suggested. Highly educated families know about disease and professional health care services. Such knowledge may lead to greater use of these 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 is included in the analysis even though it is not a relevant variable in Sweden because it was expected that considerable variation in use patterns in the United States might be explained by this variable. Most sources indicate that non-whites use less of each major type of service.[20] However, holding constant other social and economic characteristics, Rosenthal found that there was a *positive* relationship between proportion of non-whites in an area and hospital use.[21] He explained this in terms of the unfavorable environment in which non-whites live.

Enabling-Family Resources

Indicators of the ability to secure medical care will be family income and voluntary health insurance coverage. Income tends to be positively related to health service use.[22] Lack of resources to purchase health services is one reason for such a relationship. However, other factors reduce the correlation between family income and use.[23] Illness reduces family

[19] 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).

[20] 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); Straus (1967); Richardson (1967).

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

[22] Feldstein (1964, pp. 60–61); Feldstein and Carr (1964); Rosenthal (1964, pp. 29–30, 40); Smedby (1965, p. 179); Smedby (1966, p. 188).

[23] National Health Survey data indicate that low income persons in the United

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.[24]

Since Sweden has universal health insurance, the health insurance variable applies only to the United States. It is included because of observed differences in utilization patterns between insured and uninsured individuals. The insured population uses more health services than the uninsured population.[25] Insured services (mostly hospital and physician services) are more accessible 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.

Enabling-Community Resources

The community enabling variables characterize the community in which the individual lives according to its urban or rural nature and geographical section of the country. Families living in urban areas have traditionally used more services than families in rural areas.[26] Factors thought to contribute to higher urban use are ease of access to health service facilities and values conducive to health service use.[27]

States 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). In Sweden Inghe (1958) has shown that people on social welfare relief have increased morbidity for disabling diseases, mental as well as physical.

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

[25] 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, (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).

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

[27] 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 lengths 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); Smedby (1966, p. 183) has shown higher use of prescribed drugs in urban areas compared to rural areas in Sweden.

The distribution of health care facilities varies considerably from one section of the country to another in the United States.[28] 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.[29] Consequently, the part of the country in which the family lives can influence use patterns.[30] Since there are also some differences in health service resources between the Northern and Southern parts of Sweden, a region variable was also included for the Swedish sample.[31]

Perceived Illness

Illness is measured by respondent reports of general level of health and specific symptoms experienced during the survey year.[32] Health level is the more general of the two measures of illness, since it is not based on specific symptoms or disabilities. It deals with more comprehensive impressions of health. For each adult person in the two samples a judgment was elicited as to whether the person's health was, in general, good, fair, or poor.[33]

The measure of symptoms of illness is more specifically related to perceived signs of distress which lead individuals to seek health services. This measure is based on response to a checklist of fifteen symptoms. It is

[28] American Hospital Association (1966).

[29] Department of the Army (1961).

[30] Hirschfeld 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 North East. In contrast, length of stay was highest in the North East 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 North East 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 cost per person for medicines and the largest number of acquisitions of prescribed medicines per person per year. See NCHS (1966, Series 10, No. 33, pp. 6, 9, 21, 31).

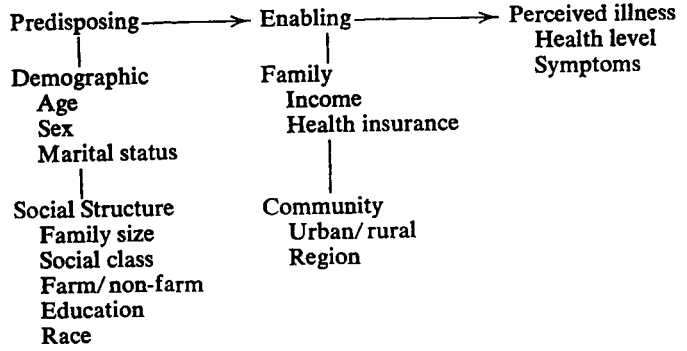
[31] Resource-population ratios vary considerably among the 30 counties and county boroughs, mainly because of the location of big medical centers in the university towns. The hospital bed-population ratio tends to be lower, however, in the Northern part of Sweden. See Medicinalstyrelsen (1965, pp. 20–21). The same applies to the physician-population and the dentist-population ratios. See Medicinalstyrelsen (1964, p. 61). According to Riksförsäkringsverket (1968, p. 52) physician visits per person per year are lower in the Northern part of the country.

[32] For a report of how these measures are related to the medical care used by families in the United States see Andersen (1968).

[33] Different categories, however, were used in the Swedish and in the U.S. questionnaire for this variable. See footnote 1 in Chapter VII and Appendix B.

the sum of all symptoms which individuals reported experiencing during the survey year.[34]

A summary list of the variables chosen to represent various components of the model is shown below:



DISTRIBUTIONAL POSTULATES

In the previous sections we have developed a general behavioral model which attempts to describe why people in any system use health services. In this section we will employ these general concepts in order to develop some postulates concerning why determinants for use of health services might differ between Sweden and the United States. Our general assumption, then, is that while all of the components of the model have a logical relationship to use of health services in both countries, some will be more important in one country while others will better explain utilization patterns in the second.

Our postulates about the relative importance of these components are inferred from observed differences between the health care systems. They are also based in some instances on other more general social characteristics. The postulates will be divided according to the major components of the behavioral model: predisposing (demographic and social structure), enabling (family resources and community resources) and perceived illness.

Predisposing—Demographic

In characterizing the health service systems, we have described Sweden's as having a higher degree of accessibility for utilization of physician

[34] This measure has also been used in the preliminary study of Andersen, Anderson and Smedby (1968). Consultations of doctors in response to the symptoms were examined and factors associated with perception and response were considered.

and hospital services and drugs. In a system with relatively high accessibility we would expect age and sex to be better predictors of health service use than in a system with lower accessibility. This is because age and sex are important indicators of a person's physiological state and consequently of his potential demand for health services. High accessibility facilitates the realization of this demand. Since accessibility to dental services is assumed to be similar for adults in the two systems, no such difference in the effect of age and sex was expected.

Marital status also describes a basic state of the individual which influences the probability that he will seek medical care and the volume of medical care he will receive. Hence, young married women are relatively high utilizers because of maternity care. The single, widowed, and divorced might be expected to require longer hospital stays because there is no spouse at home to take care of them. Finally, family disruptions, signified by divorce and widowhood, might make people in these categories prime candidates for treatment of mental and psychosomatic illness. In all of these cases we might predict that conditions are more likely to result in treatment in the more accessible system in Sweden. If so, marital status might well be a better predictor of medical care in Sweden than in the United States.

Postulate (a 1): Predisposing demographic variables will be better predictors of the population's use of physician and hospital services and prescribed drugs in Sweden than in the United States.

Postulate (a 2): Predisposing demographic variables will have similar influence on use of dental services in Sweden and the United States.

Predisposing—Social Structure

Our general expectation is that the social structure variables will be better predictors of all kinds of utilization in the United States than in Sweden. One underlying assumption leading to this expectation is that social differences between people will have less effect on their medical care utilization under a system which has a high degree of accessibility. A number of more specific reasons for the general expectation relate to the particular variables included in the social structure category.

Family size is expected to be more important in the United States because large families sometimes substitute the services of their own members for those of the formal medical care system. Families in the more accessible system have less incentive to substitute and, hence, would behave more like smaller families and individuals living alone who have fewer alternatives to formal medical care. Following this reasoning, we would expect to find individuals from large families behaving more like

those in small families with respect to medical care in Sweden than in the United States. Consequently, family size should differentiate use patterns better in the latter country.

The variables social class and education may generally have less impact in understanding behavior in Sweden than they have in the United States. Sweden is a more homogeneous country with respect to social conditions. In part, this reflects its much smaller population and land area. The people in Sweden, for the most part, are considerably more homogeneous with respect to religion and cultural background than those in the United States, even though migration to Sweden has increased considerably since World War II. In addition, the social policies of the welfare state, to the extent they are successful, would seem to minimize class differences.

We are then proposing that the social-structural characteristics education and social class will generally differentiate individual use patterns more in the United States than in Sweden. In addition, we know there is considerable difference according to race in the United States—a factor not relevant to Swedish use patterns.

We suspect that there may be at least one major exception to the argument that social structural differences are more important in the United States. This exception concerns differences in use according to the degree of urbanization in the two countries. We know that such differences have been decreasing rapidly in the United States due to the homogenizing effects of education, mass communication, and a highly developed transportation system. Such changes are also taking place in Sweden.

TABLE 12

RELATIVE DIFFERENCES BETWEEN PERSONS[a] LIVING IN FAMILIES HEADED BY FARMERS AND ALL OTHER PERSONS ACCORDING TO AGE, SEX, MARITAL STATUS, AND FAMILY SIZE

CHARACTERISTIC	SWEDEN			U.S.		
	Farm (1)	Non-farm (2)	Ratio farm/non-farm (1)/(2)	Farm (4)	Non-farm (5)	Ratio farm/non-farm (4)/(5)
Percent 65 and over	33.1	14.8	2.2	27.7	14.6	1.9
Percent female	40.3	51.1	.8	48.6	52.9	.9
Percent living in families of six or more	11.6	4.2	2.8	19.5	13.5	1.4
Percent divorced	.5	4.1	.1	2.1	4.8	.4

[a] For persons 21 and over only.

However, we would suggest that the rural person may be more different from his urban counterpart in Sweden than is true in the United States. Such differences would show up in our social class variable distinction between farmers and non-farmers. To get some idea of relative differences between farmers and non-farmers in the two countries, Table 12 compares farmers with non-farmers according to the basic demographic variables and family size. If we assume that traditional distinctions between the farm and non-farm populations include more aged persons, fewer females, more large families and fewer divorces for the rural population, we see in Table 12 that the distinctions are more pronounced in Sweden than in the United States in each case.[35] In sum, then, we suspect that farm/non-farm differences are more pronounced in Sweden and these general differences will carry over into medical care utilization patterns.

Postulate (b 1): Predisposing social structure variables will be better predictors of the population's use of all services in the United States than in Sweden.

Postulate (b 2): As an exception to (b 1) the differences in medical care utilization between the farm population and the non-farm population will be greater in Sweden than in the United States.

Enabling—Family Resources

As the accessibility of a system increases, the influence of family enabling variables should decrease. In effect, increasing third-party payments for medical care (our measure of accessibility) makes it less necessary for families to draw on their own resources. The extent of these resources should subsequently become less indicative of who does and who does not receive medical care. Using this reasoning, we would expect income to be a better indicator of the use of hospital and physician care and drugs in the United States than in Sweden because for each service accessibility is higher in Sweden. Since the costs of adult dental care are mainly paid for directly by the consumer in each system, a difference between the countries in the effect of income is not expected for dental use.

Health insurance is another important enabling resource for using hospital and physician care in the United States (drugs and dental care are generally not covered). Since, in effect, everyone has health insurance in Sweden, this important predictor of medical care usage in the United States plays no part in explaining variations in use in Sweden.

[35] It should be noted, however, that the farm population was *not* less well educated compared to the rest of the population in Sweden than in the United States and that Swedish farmers seemed to have relatively higher incomes.

Postulate (c 1): Family enabling variables will be better predictors of the population's use of hospital and physician services and drugs in the United States than in Sweden.

Postulate (c 2): Family enabling variables will have similar influence on the adult population's use of dental services in the two countries.

Enabling—Community Resources

Because the United States is a much larger country in terms of geographical area and population, we expect regional differences in medical care utilization not found in smaller, more homogeneous Sweden. Such differences in the United States might result from varying forms of medical practice, cultural differences influencing utilization patterns, volume and distribution of the system's resources, and degree of accessibility to the system (health insurance coverage varies from one region to another).

Our expectation concerning the other community characteristic, urban/rural, is the exact opposite of that for geographical region. Here we expect the differences between urban and rural communities to be more important in predicting medical care usage in Sweden than in the United States. The reasoning is the same as that used for the postulate concerning the farm/non-farm distinction. We feel that the rural culture which has traditionally influenced medical care patterns in both countries has remained more pervasive in Sweden than in the United States.

Postulate (d 1): Region of residence will be a better predictor of the population's use of all services in the United States than in Sweden.

Postulate (d 2): Urban/rural classification of residence will be a better predictor of the population's use of all services in Sweden than in the United States.

Perceived Illness

A basic premise of our study has been that, as degree of accessibility to the system increases, the role played by level of illness both as perceived by patients and as defined by practitioners in the system will become more important. In fact, the basic assumption in removing financial barriers to medical care is that people who "need" medical care will get it. Our definition of need in this study is restricted to perceptions on the part of the individual.

However, we do not expect our health variables to be better predictors of dental care for adults in Sweden than in the United States. One reason is that neither system facilitates the transfer of perceived need into effective demand for service, in this case through methods of third-party payment. Further, little relationship might be expected in either country be-

cause our measures of need are not directly related to patient perceptions which might lead to the use of dental services.[36]

Postulate (e 1): Perceived health level will be a better predictor of use of health services in Sweden than in the United States.[37]

Postulate (e 2): Perceived health level will have little influence on use of dental services in either country.

Table 13 provides a summary of the postulates developed in the chapter. In the following chapters we will examine characteristics of the population related to the use of various kinds of services in light of these postulates.

TABLE 13

POSTULATES CONCERNING THE RELATIVE EFFECTS OF VARIOUS PREDICTORS OF MEDICAL CARE UTILIZATION

TYPE OF UTILIZATION	COUNTRY IN WHICH PREDICTOR IS POSTULATED TO BE MORE IMPORTANT				
	Predisposing		Enabling		Perceived Illness
	Demographic	Social Structure	Family	Community	
Physician..	Sweden (a 1)[a]	U.S. (b 1) (Except farm/non-farm in Sweden) (b 2)	U.S. (c 1)	Region in U.S. (d 1) Urban/rural in Sweden (d 2)	Sweden (e 1)
Hospital...	Sweden (a 1)	U.S. (b 1) (Except farm/non-farm in Sweden (b 2)	U.S. (c 1)	Region in U.S. (d 1) Urban/rural in Sweden (d 2)	Sweden (e 1)
Drugs.....	Sweden (a 1)	U.S. (b 1) (Except farm/non-farm in Sweden) (b 2)	U.S. (c 1)	Region in U.S. (d 1) Urban/rural in Sweden (d 2)	Sweden (e 1)
Dental....	No difference (a 2)	U.S. (b 1) (Except farm/non-farm in Sweden) (b 2)	No difference (c 2)	Region in U.S. (d 1) Urban/rural in Sweden (d 2)	No difference (e 2)

[a] These designations refer to the postulate identifications in the text of this chapter.

[36] Our model would be more applicable to use of dental care if we use different need variables, more directly related to dental care. For example, a direct question such as "Have you had a toothache in the last year?" would be suitable.

[37] An alternative way of reasoning is that need will actually be a better predictor in the system with more limited accessibility. This is because the financial barrier will result in only those people who are most in need seeking care. This hypothesis assumes a relatively equal distribution of enabling resources among the population so that all persons could attain services if their need were great enough.

CHAPTER V

PREDISPOSING CHARACTERISTICS AND MEDICAL CARE UTILIZATION

According to the behavioral model of health service use, predisposing, enabling, and need characteristics of the individual should all be related to his use of health services. Further, the postulates presented in the last chapter suggest how these relationships might vary between individuals in Sweden and the United States. In the following three chapters we shall examine the simple relationships of these characteristics with the utilization of physicians, hospitals, prescribed drugs, and dentists.

Our underlying purpose in these chapters is to *describe* how people use health services in each country. The model of health service use provides us with a method for organizing and presenting these descriptive findings. Further, the postulates derived from the model give us an opportunity to begin to go beyond simple description and to see to what extent the findings support our expectations about differences between countries and why these differences exist.

To provide a picture of basic relationships, we will use simple two-way cross tabulations between each predictor and each dependent variable. Because of the general association of age with use of health services and because age is also associated with other independent variables such as marital status, education, income, and illness, all tables for variables other than age will be standardized for age. Age adjustment also seemed advisable for comparing rates between countries because the Swedish population is somewhat older than the population in the United States. The standard population used will be the U.S. sample of interviewed persons except for number of hospital days and number of physician visits. In these cases, the population will be the persons in the U.S. sample using these services. The purpose of this standardizing procedure is to allow us to compare the effects of other variables in the two countries assuming that age structure is the same.[1]

All estimates given in the cross tabulations in this chapter and in the

[1] A detailed description of the age-adjustment process is found in Appendix C.

following two are presented together with their standard errors. The standard error is a measure of sampling variance.[2] It shows the variations that might occur by chance, since only samples of the populations are surveyed. Some of the differences between categories and between countries which could be calculated from the tables might therefore also be occuring by chance because of the sampling variation. Differences commented upon in the text of Chapters V–VII which are *not* significant at the .05 level will be marked with a dagger (†). Comments are made in these instances because we feel the differences are important from a substantive perspective even though they do not reach statistical significance.

This chapter on predisposing characteristics is divided into two major sections since there are two subcomponents in the predisposing component of the model. One section will deal with the demographic subcomponent. The other will consider relationships between the social structure subcomponent and health service utilization.

DEMOGRAPHIC CHARACTERISTICS

Postulate (a 1): Predisposing demographic variables will be better predictors of the population's use of physician and hospital services and prescribed drugs in Sweden than in the United States.

Postulate (a 2): Predisposing demographic variables will have similar influence on use of dental services in Sweden and the United States.

The above postulates were based on the characterization of the Swedish system as being more accessible than the system in the United States regarding use of hospitals, physicians, and prescribed drugs but not regarding dental services. Therefore, age, sex, and marital status which indicate greater potential need for health services among certain classes of people would be better predictors of use in Sweden because the potential need could be more easily translated into actual utilization. In order to provide a detailed view of the nature and direction of the relationships between the demographic variables and utilization, a series of age-adjusted cross tabulations are presented in Tables 14–19.

Seeing a Physician

When presenting data on physician visits in this and following sections of our report, we exclude visits to a hospitalized patient. No distinction is made here between visits for illnesses and other visits. Thus, physician visits for preventive measures, prenatal care and general check-ups are included. In Table 14 data are presented on the proportion of persons seeing a physician at least once during the survey year by age, sex, and marital status.

[2] The methods used for the computation of standard errors for estimates and how significance tests have been applied are described in Appendix C.

TABLE 14

PHYSICIAN CARE BY DEMOGRAPHIC CHARACTERISTICS

DEMOGRAPHIC CHARACTERISTIC	PERCENT OF PERSONS SEEING A PHYSICIAN DURING 1963, ADJUSTED FOR AGE[a]	
	Sweden	U.S.
Age	(n=2806)	(n=7711)
0–5	76 (2.7)	76 (1.4)
6–10	62 (3.4)	60 (1.7)
11–15	59 (3.5)	53 (1.8)
16–20	83 (3.4)	59 (1.9)
21–29	77 (3.3)	67 (1.6)
30–44	64 (2.8)	64 (1.3)
45–54	70 (3.1)	64 (1.6)
55–64	65 (3.4)	67 (1.9)
65 and over	69 (2.3)	66 (1.8)
Total	69 (1.1)	64 (0.5)
Age adjusted	69 (1.1)	64 (0.5)
Sex	(n=2806)	(n=7711)
Male	65 (1.5)	61 (0.8)
Female	73 (1.4)	68 (0.7)
Total	69 (1.1)	64 (0.5)
Marital status[b]	(n=1776)	(n=4454)
Never married	61 (3.2)	57 (3.0)
Married	70 (1.7)	67 (0.8)
Widowed	58 (12.1)	63 (4.9)
Divorced	72 (7.5)	64 (3.4)
Total	68 (1.4)	66 (0.7)

[a] With the obvious exception of estimates for age groups, the estimates given in this table and in Tables 15–43 (as well as the corresponding standard errors of the estimates which are given in parentheses) are age adjusted using the appropriate U.S. sample as the standard population. In the total U.S. sample of 7,749 persons, 38 cases were coded "No answer" (NA) on age. All NA's on age had to be excluded from the standard population and from the calculations of age adjusted U.S. estimates. (See Appendix C for details about the age adjustment procedure.)

The n value in parentheses at the top of each subtable gives the (unweighted) number of observations on which the total in the subtable is based. Cases coded NA on the variable used in a subtable are included in the total. The number of NA codes for different variables are given in Appendix B.

[b] For persons 21 and over only.

Table 14 shows similar relationships between the demographic variables and percent seeing a physician in the two countries. The main distinction seems to be the relatively high probability of seeing a doctor by young persons 16–29 in Sweden compared to the rest of the population. The rates for the same age groups in the United States are much closer to the mean for all persons.

Mean Number of Physician Visits

Table 15 describes volume of physician visits for persons seeing a doctor according to demographic characteristics. This table is of special interest because, contrary to our postulate, the overall relationship between age and sex and number of visits was stronger in the United States than in Sweden. The reason for the relative importance of age in the United States is that adults who see a physician in the United States get considerably more physician care than do children. While the same pattern exists in Sweden, the differences between adults and children are not so pronounced. For example, using the extreme age groups, we find that persons 65 and over in the United States have on average 1.9 times as many visits as children under 6. The same ratio in Sweden is only 1.3.

That sex is apparently a better predictor of volume of visits in the United States than in Sweden is also fairly obvious from Table 15. While there is little difference in mean number of visits between males and females in Sweden, females in the United States average one visit more per person per year than do males.

TABLE 15

MEAN NUMBER OF PHYSICIAN VISITS BY DEMOGRAPHIC CHARACTERISTICS

DEMOGRAPHIC CHARACTERISTIC	MEAN NUMBER OF PHYSICIAN VISITS FOR PERSONS SEEING A PHYSICIAN DURING 1963, ADJUSTED FOR AGE	
	Sweden	U.S.
Age	(n=2007)	(n=4972)
0–5	3.2 (0.16)	4.6 (0.19)
6–10	2.4 (0.21)	3.9 (0.19)
11–15	2.6 (0.26)	3.9 (0.24)
16–20	3.4 (0.43)	5.4 (0.44)
21–29	3.2 (0.19)	7.6 (0.39)
30–44	3.9 (0.41)	6.9 (0.35)
45–54	3.8 (0.20)	6.9 (0.40)
55–64	4.9 (0.33)	7.9 (0.56)
65 and over	4.0 (0.23)	8.6 (0.47)
Total	3.6 (0.11)	6.2 (0.12)
Age adjusted	3.5 (0.10)	6.2 (0.12)
Sex	(n=2007)	(n=4972)
Male	3.4 (0.13)	5.6 (0.19)
Female	3.6 (0.15)	6.6 (0.16)
Total	3.5 (0.10)	6.2 (0.12)
Marital status[a]	(n=1329)	(n=2918)
Never married	4.1 (0.27)	8.6 (0.99)
Married	3.8 (0.19)	7.2 (0.21)
Widowed	4.9 (0.50)	7.9 (1.11)
Divorced	5.5 (0.76)	9.0 (1.16)
Total	3.9 (0.15)	7.5 (0.19)

[a] For persons 21 and over only.

TABLE 16

HOSPITAL CARE BY DEMOGRAPHIC CHARACTERISTICS

DEMOGRAPHIC CHARACTERISTIC	PERCENT OF PERSONS WITH HOSPITAL CARE DURING 1963, ADJUSTED FOR AGE	
	Sweden	U.S.
Age	(n=2806)	(n=7711)
0–5	7.4 (1.65)	7.2 (0.83)
6–10	7.0 (1.95)	5.4 (0.76)
11–15	6.5 (1.79)	4.2 (0.72)
16–20	9.7 (2.59)	5.9 (0.93)
21–29	4.3 (1.38)	6.8 (0.85)
30–44	7.2 (1.37)	8.5 (0.74)
45–54	9.5 (1.71)	10.6 (1.05)
55–64	11.3 (1.89)	11.9 (1.33)
65 and over	12.0 (1.50)	12.7 (1.26)
Total	8.5 (0.58)	8.0 (0.31)
Age adjusted	8.1 (0.58)	8.0 (0.31)
Sex	(n=2806)	(n=7711)
Male	7.7 (0.79)	8.2 (0.45)
Female	8.4 (0.85)	7.9 (0.42)
Total	8.1 (0.58)	8.0 (0.31)
Marital status[a]	(n=1776)	(n=4454)
Never married	8.4 (1.56)	10.0 (1.96)
Married	8.1 (0.87)	9.5 (0.51)
Widowed	10.5 (1.98)	9.4 (2.97)
Divorced	5.8 (2.12)	12.4 (2.32)
Total	8.4 (0.71)	9.7 (0.44)

[a] For persons 21 and over only.

After age-adjusting, there are no significant differences between categories according to marital status in either of the two countries.

Admission to a Hospital

As stated earlier, the data on hospital care reported on here include both short-term and long-term hospital care but exclude hospital care for obstetrics and disorders of pregnancy. Table 16 describes the proportion of persons with hospital care by demographic characteristics.

While the overall relationships between age and the fact of hospital admission are similar in the two countries, Table 16 shows that the nature of these relationships differs somewhat. The percentage of children and adolescents aged 6–20 admitted to the hospital relative to the percent of other age groups admitted was considerably higher in Sweden than in the United States. Comparing the actual percent admitted in each age group, for every group under 21 the percent admitted is higher in Sweden while for every age group 21 and over the percent is higher† in the United States. These findings, together with those on physician utilization, seem to indicate a difference in distribution of services according to age. There seems to be a relative emphasis on these services to children in Sweden and to adults in the United States.

The age-adjusted percentages do suggest a different pattern of hospital admission by sex. Even with obstetrical admissions excluded, we still find a greater proportion of women entering the hospital in Sweden† while men are more likely to enter the hospital in the United States.†

Mean Number of Hospital Days

Volume of hospital care in this study is measured by the number of days in the hospital during the survey year for persons with at least one admission. The mean number of days for hospitalized adult patients is given in Table 17.

Table 17 shows quite vividly that age is a better predictor of days spent in the hospital in Sweden than in the United States. In Sweden patients in the first three age groups from 21 through 54 are quite similar in the time they spend in the hospital. However, there is a considerable increase in mean days for persons 55–64 and for those 65 and over. In contrast, mean number of hospital days for the first four age groups differ only slightly in the United States and the relative increase for the oldest group 65 and over is considerably less than in Sweden. Thus in Sweden we find patients 65 and over spending on average almost 2.5 times as

† A dagger indicates here and in the remainder of this chapter differences *not* significant at the .05 level.

many days in the hospital as do young adults 21–29. In the United States the aged patient spends only about 1.5 times as many days in the hospital as his younger counterpart.

TABLE 17

MEAN NUMBER OF HOSPITAL DAYS BY DEMOGRAPHIC CHARACTERISTICS

DEMOGRAPHIC CHARACTERISTIC	MEAN NUMBER OF HOSPITAL DAYS FOR PERSONS[a] WITH HOSPITAL CARE DURING 1963, ADJUSTED FOR AGE	
	Sweden (n=351)	U.S. (n=431)
Age		
21–29	16.4 (2.24)	13.5 (4.71)
30–44	18.5 (2.36)	11.9 (1.39)
45–54	15.7 (2.54)	13.8 (2.37)
55–64	24.8 (2.33)	13.4 (1.75)
65 and over	40.2 (5.13)	20.3 (4.15)
Total	24.3 (1.57)	14.5 (1.27)
Age adjusted	23.3 (1.45)	14.5 (1.27)
Sex		
Male	25.2 (2.47)	16.1 (2.36)
Female	22.8 (1.98)	13.0 (1.17)
Total	23.3 (1.45)	14.5 (1.27)
Marital status		
Never married	30.8 (4.80)	15.5 (4.82)
Married	20.8 (1.70)	12.3 (1.31)
Widowed	26.4 (7.27)	27.3 (8.50)
Divorced	51.8 (20.00)	35.1 (13.28)
Total	23.3 (1.45)	14.5 (1.27)

[a] For persons 21 and over only.

Prescribed Drugs

The postulate that demographic characteristics would be better predictors of who would use prescribed drugs in Sweden than they would in the United States can be examined in detail in Table 18. Persons 65 and over are considerably more likely than any other age group to use drugs in Sweden. It cannot be stated that age is a better predictor of drug use in Sweden, however, because there is a consistent increase in the proportion using drugs with increasing age in the United States, even if the rate of increase from group to group is relatively small.

Women are considerably more likely to use prescribed drugs than

men in both countries according to Table 18. Further, the relative difference between men and women is similar in Sweden and the United States. Widowed and divorced persons appear to be relatively high users of prescribed drugs in Sweden.† In the United States widowed and divorced persons do not appear to have a particularly high probability of using prescribed drugs compared to the rest of the population.

TABLE 18

USE OF PRESCRIBED DRUGS BY DEMOGRAPHIC CHARACTERISTICS

DEMOGRAPHIC CHARACTERISTIC	PERCENT OF PERSONS[a] USING PRESCRIBED DRUGS DURING 1963, ADJUSTED FOR AGE	
	Sweden (n=1776)	U.S. (n=4454)
Age		
21–29	63 (3.8)	43 (1.7)
30–44	57 (2.9)	45 (1.3)
45–54	61 (3.2)	47 (1.7)
55–64	61 (3.5)	50 (2.1)
65 and over	73 (2.2)	54 (1.9)
Total	62 (1.4)	47 (0.7)
Age adjusted	62 (1.5)	47 (0.7)
Sex		
Male	54 (2.1)	40 (1.1)
Female	70 (2.0)	54 (1.0)
Total	62 (1.5)	47 (0.7)
Marital status		
Never married	51 (3.3)	42 (3.0)
Married	63 (1.8)	48 (0.9)
Widowed	77 (10.0)	53 (5.0)
Divorced	77 (6.9)	48 (3.5)
Total	62 (1.5)	47 (0.7)

[a] For persons 21 and over only.

Dental Care

Table 19 shows that age is a better predictor of who will see a dentist in Sweden than in the United States. While use decreases with increased age in each country, as expected, the difference in utilization rates between the young and the old is more pronounced in Sweden. Thus, young adults in Sweden are 4.5 times more likely to see a dentist in a year than are persons 65 and over. The corresponding ratio in the United States is 2.4.

While the overall proportion of persons seeing a dentist is similar in the two systems, adults under 45 are more likely to see a dentist in Sweden while those 45 and over are more likely to have dental care in the United States.

The main distinction between the two countries may be that the free school dental service institutes different dental care patterns among young persons in the two countries, leading to higher use among young Swedes than among young Americans. Some support for this explanation can be found in Table 19 which shows the greatest difference between the two countries to exist in the age group 21–29.

TABLE 19

DENTAL CARE BY DEMOGRAPHIC CHARACTERISTICS

DEMOGRAPHIC CHARACTERISTIC	PERCENT OF PERSONS[a] SEEING A DENTIST DURING 1963, ADJUSTED FOR AGE	
	Sweden (n=1776)	U.S. (n=4454)
Age		
21–29	68 (3.6)	45 (1.7)
30–44	51 (3.0)	45 (1.3)
45–54	39 (3.2)	42 (1.7)
55–64	28 (3.2)	32 (1.9)
65 and over	15 (1.8)	19 (1.5)
Total	41 (1.4)	39 (0.7)
Age adjusted	43 (1.4)	39 (0.7)
Sex		
Male	40 (2.0)	36 (1.0)
Female	46 (2.0)	41 (1.0)
Total	43 (1.4)	39 (0.7)
Marital status		
Never married	46 (3.0)	43 (3.0)
Married	42 (1.7)	39 (0.8)
Widowed	43 (12.1)	39 (5.0)
Divorced	34 (7.6)	27 (3.0)
Total	43 (1.4)	39 (0.7)

[a] For persons 21 and over only.

The cross tabulations for sex and marital status reveal no major distinction between the two countries. Women are more likely to see a dentist in each country.

Summary—Demographic Characteristics

Overall, the cross tabulations did indicate, as suggested by the postulates, that of the demographic variables, age is a better predictor of who will see a doctor and of days inpatients spend in a hospital in Sweden than in the United States. In addition age also was a better predictor of who would see a dentist though this had not been anticipated. The major exception to our expectations was that age and sex were better indicators of the number of physician visits people would have in the United States rather than in Sweden.

Differences in the way services are distributed according to age are probably the most revealing additional findings gleaned from this demographic analysis. With respect to physician services and *admissions* to a hospital, we might characterize the distributional pattern as being more "youth oriented" in Sweden than in the United States. In contrast, the proportion of total hospital inpatient days provided to older persons compared to the rest of the population is greater in Sweden than in the United States.

SOCIAL STRUCTURE CHARACTERISTICS

Postulate (b 1): Predisposing social structure variables will be better predictors of the population's use of all services in the United States than in Sweden.

Postulate (b 2): As an exception to (b 1) the differences in medical care utilization between the farm population and the non-farm population will be greater in Sweden than in the United States.

The assumption underlying postulate (b 1) is that the class system is more heterogeneous in the United States than in Sweden. Greater heterogeneity may result in more varied behavior of many kinds including health and illness behavior. In addition we expected family size to be more important in the United States because of a greater incentive to substitute family care when available for formal medical care. The exception for the farm/non-farm distinction was made because we suspected that rural culture remains more distinct in Sweden than in the United States.

When analysing the relationship between family size and different types of use, we have separated adult respondents from children for two reasons. Firstly, this variable may have different effects among adults and children. Secondly, the age-adjusting process cannot be performed properly for the one person family if we combine children and adults since there are no children living alone. Therefore, in Table 20 and in the following cross tabulations on social structure chracteristics, separate subtables are presented for adults and children by family size.

Seeing a Physician

Table 20 shows that the relationship for adults between family size and seeing a doctor is not a simple one in either country. However, it appears that adults living in the largest families are least likely to see a doctor in both countries. Among children in both countries the probability of seeing a doctor decreases with increasing family size, starting with the three person families. The unusual nature of two person families including a child or the high standard errors of the estimates may account for the fact that such children do not fit the general curve.

The percent seeing a doctor increases in both countries as educational level increases (Table 20). Contrary to our expectations, however, the difference between low and high education level is not greater in the United States. The probability of seeing a physician also increases with increasing social class level. Here, the difference between classes is, as predicted, greater in the United States. Finally, farmers and their families are less likely to see a doctor than are non-farmers in both countries. The expectation that the farm/non-farm distinction would be greater in Sweden was not supported.

Mean Number of Physician Visits

Table 21 shows few different patterns between the social structure variables and number of physician visits in the United States. In comparison with Sweden, our postulate that social structure would be a better predictor of number of visits is not generally supported. In contrast, the postulate that farmers would differ more from non-farmers in Sweden is substantiated in that non-farmers average close to a visit per person more per year. However, the difference between farmers and non-farmers is not significantly greater in Sweden than in the United States. Another discernable trend in Sweden is a decreasing mean number of visits with increasing family size among adults which is not found in the United States.

Admission to a Hospital

Table 22 shows that neither postulate about the effect of social structure on utilization receives much support with respect to hospital admissions. Neither family size nor education nor social class predict who will enter a hospital better in the United States than in Sweden. In both countries adult persons living alone and those in families of six or more show the highest percent with hospital care.† Education appears inversely related to the probability of entering a hospital; people of higher social

TABLE 20

PHYSICIAN CARE BY SOCIAL STRUCTURE CHARACTERISTICS

SOCIAL STRUCTURE CHARACTERISTIC	PERCENT OF PERSONS SEEING A PHYSICIAN DURING 1963, ADJUSTED FOR AGE	
	Sweden	U.S.
Family size (adults)[a]	(n=1776)	(n=4454)
One	65 (3.8)	68 (2.9)
Two	71 (3.3)	66 (1.7)
Three	73 (2.8)	64 (1.7)
Four	66 (3.6)	66 (1.9)
Five	71 (5.0)	63 (2.6)
Six or more	61 (6.4)	58 (2.5)
Total	68 (1.4)	66 (0.7)
Family size (children)[b]	(n=895)	(n=2610)
Two	52 (24.4)	78 (8.8)
Three	80 (3.5)	82 (2.5)
Four	72 (2.9)	76 (1.7)
Five	62 (4.0)	69 (1.9)
Six or more	52 (4.0)	51 (1.5)
Total	67 (1.8)	64 (0.9)
Education[a]	(n=1776)	(n=4454)
Low	66 (1.7)	61 (1.2)
Middle	79 (3.1)	67 (1.3)
High	79 (4.4)	71 (1.6)
Total	68 (1.4)	66 (0.7)
Social class[c]	(n=2275)	(n=6946)
Low	70 (1.5)	60 (0.8)
Middle	71 (1.9)	73 (0.9)
High	79 (3.4)	78 (2.1)
Total[c]	71 (1.1)	65 (0.6)
Farm/Non-farm	(n=2806)	(n=7711)
Farm	57 (3.1)	53 (2.2)
Non-farm	71 (1.1)	65 (0.6)
Total	69 (1.1)	64 (0.5)
Race		(n=7711)
White	.....	67 (0.6)
Non-white	.....	49 (1.5)
Total	.....	64 (0.5)

[a] For persons 21 and over only.
[b] For children aged 0–15 only. Percentages not adjusted for age.
[c] Excludes farmers and NA's.

TABLE 21

MEAN NUMBER OF PHYSICIAN VISITS BY SOCIAL STRUCTURE CHARACTERISTICS

SOCIAL STRUCTURE CHARACTERISTIC	MEAN NUMBER OF PHYSICIAN VISITS FOR PERSONS SEEING A PHYSICIAN DURING 1963, ADJUSTED FOR AGE	
	Sweden	U.S.
Family size (adults)[a]	(n=1329)	(n=2918)
One	4.4 (0.32)	8.1 (0.76)
Two	3.9 (0.27)	8.0 (0.65)
Three	3.8 (0.21)	7.3 (0.39)
Four	3.7 (0.51)	7.1 (0.47)
Five	3.6 (0.36)	8.1 (0.71)
Six or more	2.9(0.29)	7.0 (0.60)
Total	3.9 (0.15)	7.5 (0.19)
Family size (children)[b]	(n=565)	(n=1672)
Two	3.0 (1.02)	5.6 (1.43)
Three	3.6 (0.33)	5.0 (0.36)
Four	2.6 (0.14)	4.6 (0.24)
Five	2.7 (0.27)	4.0 (0.23)
Six or more	2.3 (0.23)	3.8 (0.19)
Total	2.8 (0.12)	4.2 (0.12)
Education[a]	(n=1329)	(n=2918)
Low	3.8 (0.12)	7.2 (0.28)
Middle	4.3 (0.48)	7.6 (0.35)
High	3.4 (0.34)	7.3 (0.45)
Total	3.9 (0.15)	7.5 (0.19)
Social class[c]	(n=1666)	(n=4544)
Low	3.6 (0.12)	6.1 (0.16)
Middle	3.8 (0.25)	6.3 (0.21)
High	3.1 (0.25)	6.1 (0.57)
Total[c]	3.6 (0.11)	6.2 (0.13)
Farm/Non-farm	(n=2007)	(n=4972)
Farm	2.8 (0.17)	5.9 (0.56)
Non-farm	3.6 (0.11)	6.2 (0.13)
Total	3.5 (0.10)	6.2 (0.12)
Race		(n=4972)
White	.....	6.2 (0.13)
Non-white	.....	6.4 (0.36)
Total	.....	6.2 (0.12)

[a] For persons 21 and over only.
[b] For children aged 0–15 only. Means not adjusted for age.
[c] Excludes farmers and NA's.

TABLE 22

HOSPITAL CARE BY SOCIAL STRUCTURE CHARACTERISTICS

SOCIAL STRUCTURE CHARACTERISTIC	PERCENT OF PERSONS WITH HOSPITAL CARE DURING 1963, ADJUSTED FOR AGE	
	Sweden	U.S.
Family size (adults)[a]	(n=1776)	(n=4454)
One	10.7 (2.00)	10.5 (1.87)
Two	8.8 (1.89)	9.7 (0.98)
Three	8.8 (1.50)	10.1 (1.04)
Four	6.0 (2.22)	8.3 (1.10)
Five	7.2 (2.33)	7.7 (1.57)
Six or more	11.3 (4.12)	11.5 (1.77)
Total	8.4 (0.71)	9.7 (0.44)
Family size (children)[b]	(n=895)	(n=2610)
Two } [c]	6.5 (1.95)	4.3 (1.27)
Three }		
Four	5.4 (1.57)	7.2 (1.05)
Five	8.0 (2.32)	5.8 (0.95)
Six or more	8.9 (2.40)	5.2 (0.66)
Total	7.0 (1.02)	5.7 (0.45)
Education[a]	(n=1776)	(n=4454)
Low	9.1 (0.88)	10.7 (0.76)
Middle	8.7 (1.79)	9.3 (0.82)
High	6.0 (2.74)	7.3 (0.93)
Total	8.4 (0.71)	9.7 (0.44)
Social class[d]	(n=2275)	(n=6946)
Low	8.3 (0.85)	8.0 (0.42)
Middle	8.7 (1.15)	8.0 (0.56)
High	2.4 (0.98)	5.7 (1.28)
Total[d]	7.8 (0.62)	7.9 (0.32)
Farm/Non-farm	(n=2806)	(n=7711)
Farm	10.0 (1.78)	10.0 (1.30)
Non-farm	7.8 (0.62)	7.9 (0.32)
Total	8.1 (0.58)	8.0 (0.31)
Race		(n=7711)
White	.....	8.6 (0.34)
Non-white	.....	4.8 (0.68)
Total	.....	8.0 (0.31)

[a] For persons 21 and over only.
[b] For children aged 0–15 only. Percentages not adjusted for age.
[c] Categories collapsed to allow age-adjusted standard errors.
[d] Excludes farmers and NA's.

class have lower percentages than other people in both countries. Further, contrary to our hypothesis, differences between farmer and non-farmer are as great if not greater in the United States. The farm population has more persons admitted in both countries.†

TABLE 23

MEAN NUMBER OF HOSPITAL DAYS BY SOCIAL STRUCTURE CHARACTERISTICS

SOCIAL STRUCTURE CHARACTERISTIC	MEAN NUMBER OF HOSPITAL DAYS FOR PERSONS[a] WITH HOSPITAL CARE DURING 1963, ADJUSTED FOR AGE	
	Sweden (n=351)	U.S. (n=431)
Family size		
One	32.5 (4.04)	20.1 (5.14)
Two	20.5 (1.92)	12.8 (1.91)
Three	24.0 (4.10)	12.6 (1.62)
Four } [b]	20.4 (2.43)	11.5 (1.42)
Five }		
Six or more	11.4 7.31)	16.5 (3.62)
Total	23.3 (1.45)	14.5 (1.27)
Education		
Low	22.8 (1.49)	16.3 (2.63)
Middle	26.9 (5.28)	12.8 (1.64)
High	26.4 (10.07)	11.1 (1.84)
Total	23.3 (1.45)	14.5 (1.27)
Social class[c]		
Low	25.1 (2.38)	14.9 (1.87)
Middle } [b]	24.0 (3.24)	12.4 (1.57)
High }		
Total[c]	24.4 (1.82)	13.8 (1.28)
Farm/Non-farm		
Farm	20.5 (2.81)	17.7 (4.59)
Non-farm	24.4 (1.82)	13.8 (1.28)
Total	23.3 (1.45)	14.5 (1.27)
Race		
White	.....	13.5 (1.17)
Non-white	.....	25.6 (7.93)
Total	.....	14.5 (1.27)

[a] For persons 21 and over only.
[b] Categories collapsed to allow age-adjusted standard errors.
[c] Excludes farmers and NA's.

Mean Number of Hospital Days

The mean number of days spent in the hospital by persons with hospital care is shown in Table 23. Persons living alone spend the most time in a hospital in Sweden and people in large families the least time. It appears that individuals living alone spend the most time in the hospital

TABLE 24

USE OF PRESCRIBED DRUGS BY SOCIAL STRUCTURE CHARACTERISTICS

SOCIAL STRUCTURE CHARACTERISTIC	PERCENT OF PERSONS[a] USING PRESCRIBED DRUGS DURING 1963, ADJUSTED FOR AGE	
	Sweden (n=1776)	U.S. (n=4454)
Family size		
One	58 (3.9)	49 (3.0)
Two	64 (3.6)	45 (1.8)
Three	63 (2.9)	49 (1.7)
Four	60 (3.6)	47 (2.0)
Five	65 (5.3)	45 (2.7)
Six or more	54 (6.4)	40 (2.5)
Total	62 (1.5)	47 (0.7)
Education		
Low	61 (1.7)	43 (1.2)
Middle	63 (3.6)	49 (1.4)
High	67 (5.5)	51 (1.7)
Total	62 (1.5)	47 (0.7)
Social class[b]		
Low	63 (2.1)	44 (1.0)
Middle	62 (2.6)	53 (1.3)
High	68 (5.7)	52 (3.7)
Total[b]	63 (1.6)	47 (0.8)
Farm/Non-farm		
Farm	54 (4.3)	40 (2.9)
Non-farm	63 (1.6)	47 (0.8)
Total	62 (1.5)	47 (0.7)
Race		
White	.....	49 (0.8)
Non-white	.....	36 (2.0)
Total	.....	47 (0.7)

[a] For persons 21 and over only.
[b] Excludes farmers and NA's.

in the United States also, but the differences according to family size are less distinct than in Sweden.†

The postulate concerning the effects of education and social class, in contrast to that about family size, does receive some support in Table 23. While distinctions in Sweden appear minor, in the United States inverse relationships occur between level of education and social class and days spent in the hospital. The farm/non-farm distinction is not greater in Sweden than in the United States, but the differences are in the opposite direction in the two countries. In Sweden, farmers have fewer days in the hospital than the rest of the population† while they have more days in the United States.†

Prescribed Drugs

From Table 24, no obvious relationship between family size and using prescribed drugs is noted in either country. It does appear that individuals in large families of six or more persons are less likely to use prescribed drugs in either country.† Education and social class do appear, as predicted, to be more related to drug use in the United States than in Sweden with use increasing as the level of the variable increases.† For both Sweden and the United States the non-farm population is more likely to use drugs than the farm population. This difference appears quite similar for the two countries.†

Dental Care

Table 25 shows somewhat similar patterns in both countries regarding seeing a dentist according to family size. In both countries adults in the largest families are least likely to see a dentist. We had no expectations that family size would be a better predictor in one country than in the other. As educational and social class level increase, use of dental services among adults generally increases in both countries. While the relationships are strong in both countries, they appear, as predicted, slightly greater in the United States.† Farmers are less likely to see a dentist in both countries, but the difference is not greater in Sweden than in the United States as had been predicted. The difference between farmer and non-farmer is significant only in the United States.

Summary—Social Structure Characteristics

The data presented in this section on social structure in general seem to suggest that family size is important in both countries. It is *not* a better predictor of utilization of health services in the United States than in Sweden as had been postulated. However, the education and social class variables do tend to be better predictors in the United States than in

TABLE 25

DENTAL CARE BY SOCIAL STRUCTURE CHARACTERISTICS

SOCIAL STRUCTURE CHARACTERISTICS	PERCENT OF PERSONS[a] SEEING A DENTIST DURING 1963, ADJUSTED FOR AGE	
	Sweden (n=1776)	U.S. (n=4454)
Family size		
One	46 (3.7)	44 (3.1)
Two	42 (3.6)	38 (1.8)
Three	45 (2.8)	40 (1.6)
Four	43 (3.4)	42 (1.6)
Five	36 (5.2)	35 (2.2)
Six or more	32 (5.7)	29 (2.0)
Total	43 (1.4)	39 (0.7)
Education		
Low	38 (1.7)	25 (1.1)
Middle	63 (3.7)	46 (1.4)
High	61 (5.8)	55 (1.7)
Total	43 (1.4)	39 (0.7)
Social class[b]		
Low	37 (2.1)	32 (0.9)
Middle	52 (2.6)	48 (1.3)
High	66 (5.4)	64 (3.4)
Total[b]	45 (1.6)	39 (0.8)
Farm/Non-farm		
Farm	38 (4.1)	29 (2.7)
Non-farm	45 (1.6)	39 (0.8)
Total	43 (1.4)	39 (0.7)
Race		
White	.....	41 (0.8)
Non-white	.....	24 (1.8)
Total	.....	39 (0.7)

[a] For persons 21 and over only.
[b] Excludes farmers and NA's.

Sweden. The farm/non-farm distinction is generally not shown to be a better predictor of use in Sweden. The distribution by race in the United States shows that this is a relatively important variable for accounting for differences in utilization which should be taken into account.

The social structure variables within both countries are better able to explain who will see a doctor or a dentist than they are in explaining differences in the other use measures.

CHAPTER VI

ENABLING CHARACTERISTICS AND MEDICAL CARE UTILIZATION

According to the model, there are two kinds of enabling characteristics which influence the amount of medical care an individual will use. These are family resources and community resources. In this chapter the relationship of each of these will be considered for the various kinds of utilization examined in this study.

FAMILY RESOURCES

Postulate (c 1): Family enabling variables will be better predictors of the population's use of hospital and physician services and drugs in the United States than in Sweden.

Postulate (c 2): Family enabling variables will have similar influences on the population's use of dental services in the two countries.

Postulate (c 1) is based mainly on the greater accessibility of the Swedish health service system. It is assumed that the resources of the family will be less important when out-of-pocket payment by the patient is minimized. Such a difference was not predicted for dental care because at the time of the study there was little third-party payment for adult dental care in either country.

Seeing a Physician

It can readily be seen in Table 26 that income is a better predictor of who will see a physician in the United States than it is in Sweden. There are practically no differences in the proportion of Swedes in the various income categories who see a doctor. In the United States there is a direct relationship between income level and the probability of seeing a physician. While almost three-quarters of the highest income group saw a physician, only slightly more than one-half of the lowest income group did so. Further, if the family carried health insurance, the individual was considerably more likely to see a physician than if the family did not have health insurance.

TABLE 26

PHYSICIAN CARE BY FAMILY RESOURCES

FAMILY RESOURCES	PERCENT OF PERSONS SEEING A PHYSICIAN DURING 1963, ADJUSTED FOR AGE	
	Sweden (n=2806)	U.S. (n=7711)
Income		
Low	72 (2.1)	53 (1.3)
Medium low	67 (2.9)	58 (1.6)
Medium	67 (2.1)	67 (1.1)
Medium high	72 (2.3)	68 (1.0)
High	71 (3.1)	72 (1.6)
Total	69 (1.1)	64 (0.5)
Health insurance		
Insured	.....	70 (0.6)
Uninsured	.....	53 (1.0)
Total	.....	64 (0.5)

Mean Number of Physician Visits

While the postulate that family resources would be a better predictor of who would see a doctor in the United States than in Sweden was quite clearly supported, the same cannot be said regarding the number of times people see the doctor. Table 27 shows that in neither country is there a clear relationship between income categories and mean number of physician visits. In the United States, in fact, low income persons who saw a doctor averaged more visits than did any other income group.† Further, health insurance seems to matter less with respect to number of visits than it does concerning who sees a doctor.

Admission to a Hospital

Regarding the relationship between income and hospital admissions (Table 28), the only outstanding feature in Sweden seems to be the relatively low estimate for persons in the highest income group. In the United States the highest income group also reported the lowest percent of hospitalized people but this difference is not so clear cut.† Except for this high income group, the probability of entering a hospital increased as income rose in the United States. The importance of enabling resources in the United States is further stressed by the much larger portion of

† A dagger indicates here and in the remainder of this chapter differences *not* significant at the .05 level.

insured than of non-insured who entered the hospital. Table 28, then, provides some evidence in agreement with our expectation that family resources would be more important in the United States.

TABLE 27

MEAN NUMBER OF PHYSICIAN VISITS BY FAMILY RESOURCES

FAMILY RESOURCES	MEAN NUMBER OF PHYSICIAN VISITS FOR PERSONS SEEING A PHYSICIAN DURING 1963, ADJUSTED FOR AGE	
	Sweden (n=2007)	U.S. (n=4972)
Income		
Low	3.4 (0.16)	6.8 (0.37)
Medium low	3.8 (0.26)	6.0 (0.34)
Medium	3.4 (0.15)	6.4 (0.23)
Medium high	3.6 (0.18)	5.8 (0.22)
High	3.8 (0.55)	6.1 (0.34)
Total	3.5 (0.10)	6.2 (0.12)
Health insurance		
Insured	.....	6.3 (0.14)
Uninsured	.....	5.9 (0.23)
Total	.....	6.2 (0.12)

TABLE 28

HOSPITAL CARE BY FAMILY RESOURCES

FAMILY RESOURCES	PERCENT OF PERSONS WITH HOSPITAL CARE DURING 1963, ADJUSTED FOR AGE	
	Sweden (n=2806)	U.S. (n=7711)
Income		
Low	9.2 (1.28)	7.1 (0.66)
Medium low	10.1 (1.74)	7.8 (0.84)
Medium	6.8 (0.97)	8.4 (0.64)
Medium high	8.2 (1.38)	9.0 (0.65)
High	5.0 (1.56)	6.6 (0.95)
Total	8.1 (0.58)	8.0 (0.31)
Health insurance		
Insured	.....	9.3 (0.40)
Uninsured	.....	5.2 (0.45)
Total	.....	8.0 (0.31)

Mean Number of Hospital Days

The relationship between family income and days spent in the hospital is quite different from the relationship of income to the other measures of utilization we have studied. As shown in Table 29, persons admitted to the hospital from the lowest income group spend more days in the hospital than do patients from other income groups. Mean days for the uninsured in the United States are also higher than for the insured.† In addition, the difference according to income seems to be greater in Sweden than in the United States. Swedes from the lowest income group have on average 1.9 times as many hospital days as those from the highest income group. In contrast, the same ratio in the United States is only 1.5.†

TABLE 29

MEAN NUMBER OF HOSPITAL DAYS BY FAMILY RESOURCES

FAMILY RESOURCES	MEAN NUMBER OF HOSPITAL DAYS FOR PERSONS[a] WITH HOSPITAL CARE DURING 1963, ADJUSTED FOR AGE	
	Sweden (n=351)	U.S. (n=431)
Income		
Low	32.3 (3.32)	19.7 (3.10)
Medium low	23.4 (2.67)	10.5 (2.02)
Medium	19.7 (2.48)	14.6 (2.36)
Medium high	28.7 (13.75)	11.5 (1.34)
High	17.3 (5.31)	13.1 (2.23)
Total	23.3 (1.45)	14.5 (1.27)
Health insurance		
Insured	.....	12.8 (0.99)
Uninsured	.....	20.8 (4.89)
Total	.....	14.5 (1.27)

[a] For persons 21 and over only.

While this finding is in opposition to our general expectations, it is not at all unreasonable. It indicates where some important modifications might be made in the postulates of the study. First, with respect to the general direction of the results in both countries, note that illness can have an adverse effect on income. Potential income is lost when a wage earner is disabled. Such people are probably overrepresented in the

low income group. In such instances, low income is indicative of serious illness as well as meager resources. Consequently, it is conceivable that persons in this category would tend to have long hospital stays.

A subsequent question is why the difference between income groups seems to be greater in Sweden. From the above discussion we might assume that the need of the low income group is greater. We have postulated that the Swedish system should be more responsive to the illness needs of its population. Thus we might expect them to spend more time in the hospital. In contrast, enabling resources might play some part in reducing the differences between the low income group and the rest of the population in the United States. Low income people may have greater need, but higher income people have more resources which still play a part in the allocation of medical care in the United States. Consequently, the differences between the low and high income groups would probably be less than in a system with greater accessibility.

Prescribed Drugs

The association between a person's income and the probability that he will use prescribed drugs during the survey yea. is not strong in either country. Still, Table 30 does indicate some correlation and some interesting differences between countries. In the United States the lowest income

TABLE 30

USE OF PRESCRIBED DRUGS BY FAMILY RESOURCES

FAMILY RESOURCES	PERCENT OF PERSONS[a] USING PRESCRIBED DRUGS DURING 1963, ADJUSTED FOR AGE	
	Sweden (n=1776)	U.S. (n=4454)
Income		
Low	68 (3.3)	40 (1.7)
Medium low	64 (4.0)	45 (2.0)
Medium	60 (2.6)	50 (1.5)
Medium high	63 (3.1)	48 (1.5)
High	63 (4.2)	51 (2.4)
Total	62 (1.5)	47 (0.7)
Health insurance		
Insured	.....	51 (0.9)
Uninsured	.....	38 (1.3)
Total	.....	47 (0.7)

[a] For persons 21 and over only.

groups appear less likely to use prescribed drugs than the higher income groups. Conversely, the lowest income group is the group most likely to use drugs in Sweden.† Since the difference between the high income and low income groups is greater in the United States, mild support is generated for the expectation that resources would be more important in the United States.

It should be noted in Table 30 that the insured population in the United States is more likely to use drugs than the uninsured population. Since drug use was not generally insured in 1963, some explanation for this relationship is in order. One consideration is that insured persons were more likely to come in contact with physicians. A basic form of physician treatment is, of course, to prescribe drugs. Consequently the insured would use more drugs. Thus it is not completely inappropriate to consider insurance an enabling resource for drug use since it can be considered at least an initiating factor leading to drug prescription.[1]

Dental Care

We did not expect income differences to be pronounced between countries because the costs of dental care are not generally reimbursed in either country. However, considerable differences were found. In both countries the higher income groups were more likely to see a dentist than the low income groups (Table 31). But the relationship seems to be more consistent in the United States. There, the percent seeing a dentist rose consistently with increasing income. Further, people in the highest income group were over twice as likely to see a dentist as people in the lowest income group. In Sweden the three lowest income groups had similar proportions seeing a dentist and there was only a 17 percentage point difference between the lowest income group and the highest income group.

Since the differences between countries cannot be explained by the overall reimbursement patterns, some other explanation is necessary. It might be argued that since the lower income groups in Sweden are spared much of the financial burden of paying for their other medical care, they are better able to afford dental care than are low income people in the United States. In Sweden, as mentioned earlier, there are also some possibilities for dental care at reduced prices for adults through the public dental service and a dental reimbursement scheme for women giving birth to a child.

[1] There is also the possibility that insured people are better able to afford drugs since they are reimbursed for other medical care they receive. In addition, people who are likely to be insured may also be the kind of people most likely to use prescribed drugs regardless of type or amount of reimbursement for medical care.

Postulate (c 1) that family resources would be better predictors of who would utilize medical care in the United States than in Sweden was supported with respect to seeing a doctor and entering a hospital. It was

TABLE 31

DENTAL CARE BY FAMILY RESOURCES

FAMILY RESOURCES	PERCENT OF PERSONS[a] SEEING A DENTIST DURING 1963, ADJUSTED FOR AGE	
	Sweden (n=1776)	U.S. (n=4454)
Income		
Low	42 (3.3)	25 (1.5)
Medium low	36 (4.0)	29 (1.9)
Medium	42 (2.6)	37 (1.5)
Medium high	49 (3.8)	46 (1.5)
High	59 (4.3)	56 (2.4)
Total	43 (1.4)	39 (0.7)
Health insurance		
Insured	.....	43 (0.9)
Uninsured	.....	27 (1.2)
Total	.....	39 (0.7)

[a] For persons 21 and over only.

not supported when number of physician visits and number of hospital days were considered. It may be that, given the system in the United States, enabling resources are particularly important for understanding who will enter the system but less important in analyzing volume of care following entry. To understand in more detail the influence of family income, it seems important to take into account the negative impact of illness on income before attempting to analyze the effect of income on medical care usage. We also found, contrary to expectations, that income was more important for predicting who would see a dentist in the United States than in Sweden even though dental care is not generally paid for by a third party in either country.

COMMUNITY RESOURCES

Postulate (d 1): Region of residence will be a better predictor of the population's use of all health services in the United States than in Sweden.

Postulate (d 2): Urban/rural classification of residence will be a better predictor of the population's use of all services in Sweden than in the United States.

An underlying assumption for these postulates is that the community in which a person lives will influence his behavior as well as his own attributes. We have predicted that the geographical part of the country in which a person lives will have a greater impact on the medical care he receives in the United States because of its larger size and heterogeneity. However, since we have assumed that a rural culture in more pervasive in Sweden, we have also predicted that the urban/rural character of the community would be more important in predicting health service use in Sweden. In the remainder of this chapter we will examine these premises for the various kinds of medical care utilization considered in this study.

Seeing a Physician

Table 32 shows that rural people are less likely to see a physician than urban people in both countries. In accord with the postulate, the difference appears to be larger in Sweden. The percent difference between the

TABLE 32

PHYSICIAN CARE BY COMMUNITY RESOURCES

COMMUNITY RESOURCES	PERCENT OF PERSONS SEEING A PHYSICIAN DURING 1963, ADJUSTED FOR AGE	
	Sweden (n=2806)	U.S. (n=7711)
Residence		
Large urban	76 (2.4)	69 (1.2)
Other urban	72 (1.8)	64 (0.8)
Rural	65 (1.6)	63 (1.0)
Total	69 (1.1)	64 (0.5)
Region		
(Sweden)		
North	71 (2.2)	.....
South	68 (1.2)	.....
(U.S.)		
North East	.....	68 (1.2)
North Central	.....	65 (1.0)
South	.....	60 (1.0)
West	.....	68 (1.3)
Total	69 (1.1)	64 (0.5)

proportion of the residents of large urban areas and rural areas is almost twice as large in Sweden as in the United States.†

Our surveys show practically no regional difference in Sweden in the proportion of people seeing a doctor (Table 32). In the United States differences are present but are not great. Fewer people in the South saw a physician during the survey year than was true in other areas of the country. This finding then provides some support for the regional differences postulate.[2]

Mean Number of Physician Visits

Swedes in less urbanized areas are not only less likely to see a physician in a year time period than the rest of the population, but those who do have, on average, fewer visits (Table 33). The same trends are found in the United States; however, the differences are much smaller and well

TABLE 33

MEAN NUMBER OF PHYSICIAN VISITS BY COMMUNITY RESOURCES

COMMUNITY RESOURCES	MEAN NUMBER OF PHYSICIAN VISITS FOR PERSONS SEEING A PHYSICIAN DURING 1963, ADJUSTED FOR AGE	
	Sweden (n=2007)	U.S. (n=4972)
Residence		
Large urban	4.4 (0.35)	6.5 (0.26)
Other urban	3.5 (0.13)	6.2 (0.19)
Rural	3.1 (0.13)	6.0 (0.20)
Total	3.5 (0.10)	6.2 (0.12)
Region		
(Sweden)		
North	2.8 (0.12)	.....
South	3.7 (0.12)	.....
(U.S.)		
North East	.....	7.3 (0.34)
North Central	.....	5.7 (0.19)
South	.....	6.0 (0.21)
West	.....	6.1 (0.26)
Total	3.5 (0.10)	6.2 (0.12)

[2] The lower rate in the South reflects in part the lower rate of use by Negroes who make up a greater portion of the population of the South than of other areas.

within sampling error. Thus the rural-urban hypothesis is supported both for seeing a physician and number of visits.

Some regional differences for number of physician visits were found in both countries. However, in this instance, the regional differences appear greater in Sweden. The rate of visits of people in the South of Sweden exceeds the rate in the North by about 40 percent. Of the four regions in the United States, the North East has the highest rate and the North Central the lowest rate. The rate in the former exceeds the rate in the latter by about 20 percent. The regional hypothesis for mean number of physician visits is, then, not supported.

Admission to a Hospital

The percentage of hospitalized people does not seem to vary consistently with degree of rurality in Sweden (Table 34). It appears somewhat lower in the large urban and rural areas than in the other urban areas.† In contrast, a consistent pattern is found in the United States. The percent of persons varies directly with the rurality of the areas.† The proportion of people admitted from rural areas is about 25 percent

TABLE 34

HOSPITAL CARE BY COMMUNITY RESOURCES

COMMUNITY RESOURCES	PERCENT OF PERSONS WITH HOSPITAL CARE DURING 1963, ADJUSTED FOR AGE	
	Sweden (n=2806)	U.S. (n=7711)
Residence		
Large urban.....	7.7 (1.37)	6.8 (0.63)
Other urban.....	8.6 (1.02)	8.0 (0.45)
Rural.....	7.9 (0.84)	8.6 (0.56)
Total.....	8.1 (0.58)	8.0 (0.31)
Region		
(Sweden)		
North.....	8.4 (1.17)	.....
South.....	8.1 (0.67)	.....
(U.S.)		
North East.....	.....	7.1 (0.64)
North Central....	.....	9.4 (0.62)
South.....	.....	7.3 (0.52)
West.....	.....	8.1 (0.74)
Total.....	8.1 (0.58)	8.0 (0.31)

higher than the proportion admitted from the large urban areas. Contrary to our hypothesis, then, the urban/rural variable seems to be a better predictor of hospital admissions in the United States than in Sweden.

Regional differences in percent admitted to the hospital were, as expected, minimal in Sweden. Some regional differences did appear in the United States. The percent of people admitted to the hospital at least once was higher in the North Central region than in the rest of the country.

Mean Number of Hospital Days

Country differences for mean number of days spent in the hospital by those admitted at least once are in the expected direction for both residence and region (Table 35). People from large urban areas who were hospitalized spent on average nine days more in the hospital than did rural patients in Sweden. Urban/rural differences in the United

TABLE 35

MEAN NUMBER OF HOSPITAL DAYS BY COMMUNITY RESOURCES

COMMUNITY RESOURCES	MEAN NUMBER OF HOSPITAL DAYS FOR PERSONS[a] WITH HOSPITAL CARE DURING 1963, ADJUSTED FOR AGE	
	Sweden (n=351)	U.S. (n=431)
Residence		
Large urban.....	29.7 (3.74)	17.0 (5.02)
Other urban.....	25.1 (3.34)	13.9 (1.41)
Rural.....	20.6 (1.84)	14.9 (2.56)
Total.....	23.3 (1.45)	14.5 (1.27)
Region		
(Sweden)		
North.....	24.2 (2.75)	.....
South.....	23.8 (1.74)	.....
(U.S.)		
North East.....	.....	13.2 (3.43)
North Central....	.....	15.3 (2.38)
South.....	.....	14.3 (2.22)
West.....	.....	16.6 (3.08)
Total.....	23.3 (1.45)	14.5 (1.27)

[a] For persons 21 and over only.

States were minor. In contrast, there were no regional differences in Sweden while patients in the western part of the United States tended to spend more days in the hospital than persons from other regions.†

Prescribed Drugs

In both Sweden and the United States rural persons are less likely to use drugs than the rest of the population (Table 36). The differences in both countries are relatively small though somewhat larger in Sweden than in the United States.† Minimal support for the postulate is then indicated.

TABLE 36

USE OF PRESCRIBED DRUGS BY COMMUNITY RESOURCES

COMMUNITY RESOURCES	PERCENT OF PERSONS[a] USING PRESCRIBED DRUGS DURING 1963, ADJUSTED FOR AGE	
	Sweden (n=1776)	U.S. (n=4454)
Residence		
Large urban	64 (3.2)	49 (1.6)
Other urban	67 (2.5)	48 (1.1)
Rural	58 (2.2)	45 (1.3)
Total	62 (1.5)	47 (0.7)
Region		
(Sweden)		
North	65 (3.2)	.....
South	61 (1.6)	.....
(U.S.)		
North East	.....	47 (1.6)
North Central	.....	45 (1.4)
South	.....	49 (1.3)
West	.....	49 (1.8)
Total	62 (1.5)	47 (0.7)

[a] For persons 21 and over only.

Regional differences in percent using prescribed drugs appear unimportant in both countries. No support is found for the expectation that differences would be greater in the United States.

Dental Care

Rural people are less likely to see a dentist than are urban people in both countries(Table 37). The difference is slightly greater in Sweden

than in the United States. Fifteen percent more of the people in large urban areas of Sweden saw a dentist during the survey year than did rural people. Eleven percent was the comparable figure in the United States. Such differences do, however, provide only marginal support for the hypothesis since the country difference is within sampling error.

TABLE 37

DENTAL CARE BY COMMUNITY RESOURCES

COMMUNITY RESOURCES	PERCENT OF PERSONS[a] SEEING A DENTIST DURING 1963, ADJUSTED FOR AGE	
	Sweden (n=1776)	U.S. (n=4454)
Residence		
Large urban	53 (3.3)	44 (1.6)
Other urban	45 (2.5)	40 (1.1)
Rural	38 (2.1)	33 (1.2)
Total	43 (1.4)	39 (0.7)
Region		
(Sweden)		
North	32 (3.1)	.....
South	46 (1.6)	.....
(U.S.)		
North East	.....	45 (1.6)
North Central	.....	40 (1.4)
South	.....	33 (1.2)
West	.....	38 (1.7)
Total	43 (1.4)	39 (0.7)

[a] For persons 21 and over only.

There are considerable regional differences in both countries concerning visits to a dentist. The proportion seeing a dentist in the South of Sweden was almost 1.4 times the proportion in the North. In the United States similar differences in proportions were found between the highest utilization area, the North East, and the lowest utilization area, the South. Since the regional differences are certainly as large in Sweden as the United States, no support is found for the expectation of larger differences in the latter country.

Summary—Community Resources

These findings tend to confirm the expectation that urban/rural differences in the utilization of health services would be greater in Sweden

than in the United States. Only for hospital admissions did the findings provide no support for the hypothesis. The data concerning regional differences were less supportive of the expectation that differences would be larger in the United States.[3] While there appeared to be larger regional differences in the United States for seeing a physician, hospital admissions, and hospital days, such was not the case for number of physician visits, the use of drugs, and seeing a dentist.

[3] One problem in examining the region hypothesis for Sweden is the relatively high correlation between region and residence, as much of the North is rural. As a result, some of the effects of the two variables are confounded in the age-adjusted cross tabulations.

CHAPTER VII

PERCEIVED ILLNESS AND MEDICAL CARE UTILIZATION

Postulate (e 1): Perceived illness will be a better predictor of use of physician and hospital services and drugs in Sweden than in the United States.

Postulate (e 2): Perceived illness will not be related to seeing a dentist in either country.

The postulate (e 1) assumes that a system with high accessibility will distribute health services more in accord with the health needs of the patient than will a system with lower accessibility. Ideally, definition of need should include both that felt by the patient and a more objective measure of need. In this study we are limited to perception of illness on the part of the patient. Two measures of this perception are utilized. One is based on response to a check list of common symptoms. The other is the patient's overall evaluation of his health. In this chapter we will examine how these perceptual measures relate to utilization of health services in Sweden and the United States.

Seeing a Physician

The number of symptoms reported by an individual has a very similar relationship to the probability of seeing a physician in Sweden and the United States (Table 38). In both countries about half of the people who reported no symptoms still saw a physician during the survey year. As the number of symptoms increases, the probability of seeing a physician rises consistently in both countries and exceeds 90 percent for persons reporting six or more. These findings provide no support for our initial postulate.

The picture is somewhat different for the level of health measurement. Table 38 shows that the differences between extreme groups are quite similar. Thus the percentage differences between those reporting good health and those reporting poor health in Sweden is 36. The percentage difference between those reporting excellent health and those reporting poor health in the United States is 30, only slightly less.

We feel, however, that the difference in the effect of health level is actually greater than the differences between extreme groups because the categories are not exactly the same.[1] The best health category, good, in Sweden includes 68 percent of the weighted sample. The best health category, excellent, comprises only 36 percent of the U.S. sample. If, however, we combine the top two categories in the United States, excellent and good, they together account for 76 percent of the U.S. sample—a figure much closer to the one in Sweden. In this chapter, then, we will publish estimates for the combined group as well as for each separate group.

TABLE 38

PHYSICIAN CARE BY PERCEIVED ILLNESS

PERCEIVED ILLNESS	PERCENT OF PERSONS[a] SEEING A PHYSICIAN DURING 1963, ADJUSTED FOR AGE	
	Sweden (n=1776)	U.S. (n=4454)
Number of symptoms reported		
None	49 (2.8)	51 (1.2)
One	70 (2.7)	68 (1.5)
Two	74 (3.3)	74 (1.8)
Three	76 (3.9)	78 (2.1)
Four or five	83 (4.0)	83 (1.9)
Six or more	92 (3.2)	91 (1.7)
Total	68 (1.4)	66 (0.7)
Level of health (Sweden)		
Good	60 (1.8)	.....
In between	87 (2.1)	.....
Poor	96 (1.0)	.....
(U.S.)		
Excellent	.....	55 (1.3) } 62 (0.8)
Good	.....	68 (1.1) }
Fair	.....	76 (1.7)
Poor	.....	85 (2.7)
Total	68 (1.4)	66 (0.7)

[a] For persons 21 and over only.

[1] The number of categories used in the Swedish questionnaire was one less than the number used in the U.S. questionnaire because we were unable to find suitable terms in Swedish for the distinction between excellent and good. The actual proportions of the total sample N in the United States and weighted N in Sweden according to perceived health were:

UNITED STATES		SWEDEN	
Health Category	Percent of n	Health Category	Percent of Weighted n
Excellent	36.0	Good	68.4
Good	39.8	Somewhat in between	25.5
Fair	16.8	Poor	5.9
Poor	6.1	NA	0.2
NA	1.3		
Total	100.0	Total	100.0

If we then examine the proportion of persons in the United States reporting excellent or good health who see a doctor we find it to be 62

TABLE 39

MEAN NUMBER OF PHYSICIAN VISITS BY PERCEIVED ILLNESS

PERCEIVED ILLNESS	MEAN NUMBER OF PHYSICIAN VISITS FOR PERSONS[a] SEEING A PHYSICIAN DURING 1963, ADJUSTED FOR AGE	
	Sweden (n=1329)	U.S. (n=2918)
Number of symptoms reported		
None	2.7 (0.15)	5.1 (0.24)
One	3.1 (0.18)	6.5 (0.43)
Two	3.8 (0.27)	7.9 (0.51)
Three	4.2 (0.28)	7.9 (0.48)
Four or five	5.0 (0.38)	9.7 (0.54)
Six or more	7.7 (1.87)	13.6 (1.12)
Total	3.9 (0.15)	7.5 (0.19)
Level of health (Sweden)		
Good	2.9 (0.11)	.....
In between	5.1 (0.54)	.....
Poor	9.3 (0.69)	.....
(U.S.)		
Excellent	.....	4.6 (0.20) } 6.0 (0.18)
Good	.....	7.0 (0.27) }
Fair	.....	9.9 (0.64)
Poor	.....	15.4 (1.52)
Total	3.9 (0.15)	7.5 (0.19)

[a] For persons 21 and over only.

percent. The difference between the excellent-good category and the poor category is then 23 percent—considerably less than the 36 percentage point difference in Sweden. From this perspective the health level measure seems to be a better predictor of who will see a doctor in Sweden than it is in the United States.

Mean Number of Physician Visits

The number of symptoms people reported experiencing during the survey year influenced the number of physician visits they had in both countries (Table 39). Further, the similarity of proportional differences between those with no symptoms and those with six or more is indicative of the high comparability of the results in the two countries. Swedes with six or more symptoms reported 2.9 times as many visits as those with no symptoms. The ratio for Americans in the same health categories was 2.7.

The findings for health level suggest that the differences within the populations are very similar if we compare extreme groups. If we combine the excellent and good groups in the United States, however, the difference again appears to be greater in Sweden.† Swedes reporting poor health have 3.2 times as many visits as those reporting good health. Americans reporting poor health average 2.6 times as many visits as those who rate themselves as being in either excellent or good health.

Admission to a Hospital

The difference in the predicting power of the health variables between countries is considerably more apparent with respect to hospital utilization than with respect to physician utilization. Table 40 shows differences not only with respect to health level but also for number of symptoms reported. While the likelihood of hospital admissions increases with number of symptoms reported in both countries, the proportion of the population with six or more symptoms reporting hospital admission in Sweden was 5.6 times the proportion of those with no symptoms who were hospitalized. The corresponding ratio in the United States was 4.5.

The differences are even more striking for health level. Almost none of the Swedes in good health were admitted to the hospital during the survey year. Almost one-half of those reporting poor health were admitted. In contrast, in the United States even those in the excellent health category report more hospitalizations than the Swedes in the good health category. Only one-third of the Americans in the poor health category had hospital admissions. In other words, the range between categories is considerably narrower in the United States.

† A dagger indicates here and in the remainder of this chapter differences *not* significant at the .05 level.

TABLE 40

HOSPITAL CARE BY PERCEIVED ILLNESS

PERCEIVED ILLNESS	PERCENT OF PERSONS[a] WITH HOSPITAL CARE DURING 1963, ADJUSTED FOR AGE	
	Sweden (n=1776)	U.S. (n=4454)
Number of symptoms reported		
None	3.7 (0.89)	5.4 (0.58)
One	5.8 (1.17)	7.8 (0.86)
Two	6.7 (1.54)	12.1 (1.32)
Three	13.5 (2.93)	11.2 (1.56)
Four or five	16.9 (3.76)	17.5 (1.97)
Six or more	20.9 (4.30)	24.1 (2.72)
Total	8.4 (0.71)	9.7 (0.44)
Level of health (Sweden)		
Good	2.4 (0.50)	.....
In between	18.5 (2.44)	.....
Poor	46.6 (7.13)	.....
(U.S.)		
Excellent	.....	3.8 (0.49) } 6.8 (0.44)
Good	.....	9.3 (0.69) }
Fair	.....	15.0 (1.45)
Poor	.....	34.0 (3.72)
Total	8.4 (0.71)	9.7 (0.44)

[a] For persons 21 and over only.

Mean Number of Hospital Days

Table 41 shows that the number of days patients spend in the hospital is not so closely related to the number of symptoms they report as have been the other measures of utilization we have considered. While in both countries the people reporting the most symptoms tend to have spent more days in the hospital, the overall relationship is not so clearly monotonic.

As postulated, number of hospital days is more closely related to health level in Sweden than in the United States. People in excellent, good, and fair health report similar numbers of hospital days in the United States. Only those in poor health are significantly differentiated from the other groups, as they report more hospital days. In Sweden

TABLE 41

MEAN NUMBER OF HOSPITAL DAYS BY PERCEIVED ILLNESS

PERCEIVED ILLNESS	MEAN NUMBER OF HOSPITAL DAYS FOR PERSONS[a] WITH HOSPITAL CARE DURING 1963, ADJUSTED FOR AGE	
	Sweden (n=351)	U.S. (n=431)
Number of symptoms reported		
None	20.6 (2.38)	11.8 (2.73)
One	24.0 (4.23)	10.6 (0.99)
Two	18.6 (8.55)	14.3 (3.07)
Three	27.7 (4.56)	15.2 (3.31)
Four or five	21.9 (2.20)	17.4 (3.09)
Six or more	31.6 (4.11)	16.5 (2.68)
Total	23.3 (1.45)	14.5 (1.27)
Level of health (Sweden)		
Good	12.4 (2.16)	.....
In between	21.0 (1.79)	.....
Poor	36.1 (3.91)	.....
(U.S.)		
Excellent	.....	10.9 (2.87) } 13.5 (2.36)
Good	.....	13.6 (2.54) }
Fair	.....	12.9 (1.35)
Poor	.....	22.2 (3.43)
Total	23.3 (1.45)	14.5 (1.27)

[a] For persons 21 and over only.

there is a strong monotonic relationship between level of health and days spent in the hospital. Swedish patients in poor health spent on average almost three times as many days in the hospital as those in good health.

Prescribed Drugs

The proportion of people using prescribed drugs is quite closely associated with symptoms reporting in both Sweden and the United States (Table 42). In each country the likelihood of using prescribed drugs becomes consistently greater as the number of symptoms the person experiences increases. There is little reason to believe from these distributions that the symptoms variable is a stronger predictor of drug use in one country than in the other.

A similar conclusion might be drawn about the level of health predictor if we simply look at the four category variable in the United States

and compare it with the three category variable in Sweden (Table 42). However, some difference is discernible if we combine the in between and poor groups in both countries and compare them with the good and excellent-good groups. This procedure tells us, first of all, that 89 percent of the in between-poor group in Sweden used drugs and 65 percent of the fair-poor group in the United States used drugs. Taking these percents as ratios to the better health groups in each country, we find the ratio to be 1.75 in Sweden and 1.55 in the United States. This procedure, then, suggests that there may be differences in the predictive power of the health level variable between the two countries.

TABLE 42

USE OF PRESCRIBED DRUGS BY PERCEIVED ILLNESS

PERCEIVED ILLNESS	PERCENT OF PERSONS[a] USING PRESCRIBED DRUGS DURING 1963, ADJUSTED FOR AGE	
	Sweden (n=1776)	U.S. (n=4454)
Number of symptoms reported		
None	40 (2.7)	29 (1.1)
One	58 (2.9)	49 (1.6)
Two	68 (3.6)	58 (2.0)
Three	78 (3.8)	62 (2.4)
Four or five	84 (4.0)	70 (2.4)
Six or more	94 (1.7)	73 (2.7)
Total	62 (1.5)	47 (0.7)
Level of health (Sweden)		
Good	51 (1.8)	.....
In between	87 (2.2)	.....
Poor	97 (0.9)	.....
(U.S.)		
Excellent	.....	33 (1.2) } 42 (0.9)
Good	.....	50 (1.2) }
Fair	.....	62 (2.0)
Poor	.....	74 (3.4)
Total	62 (1.5)	47 (0.7)

[a] For persons 21 and over only.

Dental Care

We had no expectations about the relationship of our health variables to the proportion of people seeing a dentist since the measures are not

directly related to dental health. Table 43 shows little relationship between number of symptoms and seeing a dentist. The same might be said about perceived health and seeing a dentist in Sweden. However, in the United States there seems to be a definite tendency for people in better health to see a dentist more than people in poor health.

One possible explanation for this finding relates to the general methods of financing in the two systems. In Sweden people pay directly for a smaller portion of the medical care they receive. Thus, even if they are

TABLE 43

DENTAL CARE BY PERCEIVED ILLNESS

PERCEIVED ILLNESS	PERCENT OF PERSONS[a] SEEING A DENTIST DURING 1963, ADJUSTED FOR AGE	
	Sweden (n=1776)	U.S. (n=4454)
Number of symptoms reported		
None	42 (2.7)	35 (1.1)
One	48 (2.7)	40 (1.5)
Two	40 (3.7)	43 (2.0)
Three	42 (4.4)	42 (2.4)
Four or five	35 (5.1)	41 (2.5)
Six or more	48 (5.8)	38 (3.1)
Total	43 (1.4)	39 (0.7)
Level of health (Sweden)		
Good	45 (1.7)	.....
In between	39 (3.2)	.....
Poor	47 (6.0)	.....
(U.S.)		
Excellent	.....	43 (1.3) } 40 (0.8)
Good	.....	39 (1.1) }
Fair	.....	34 (1.9)
Poor	.....	26 (3.5)
Total	43 (1.4)	39 (0.7)

[a] For persons 21 and over only.

in poor health and have used considerable medical care, they may still feel financially able to pay for dental care. In the United States the costs of physicians, hospitals, and drugs are more likely to be paid for directly by the patient. The person in poor health who has used a considerable amount of these services and has had to pay directly for them may forego

the more elective dental services to keep his overall medical expenditures within reason.

Summary—Perceived Illness

We began this chapter with the main postulate that perceived illness would be a better predictor of medical care utilization in Sweden. In general we found that number of symptoms reported had similar relationships to utilization in the two countries. Level of health, however, was a much better predictor of hospital utilization in Sweden than in the United States. It was also a somewhat better predictor of physician and drug use in Sweden. Use of dental services was not associated with symptom reporting in either country or with health level in Sweden—bearing out our expectation. However, people who perceived themselves to be in good health in the United States were somewhat more likely to see a dentist than those who rated themselves less healthy.

CHAPTER VIII

THE RELATIVE IMPORTANCE OF INCOME AND SOCIAL CLASS FOR HEALTH CARE UTILIZATION

Up to this point our analysis has been primarily of simple relationships between a single characteristic of the population and health service use. Only through the process of age-adjusting the cross tabulations have we taken into account the influence that an additional factor might have on the simple relationship. Of course, in reality, the relationships are often more complex than this, as has been suggested by the behavioral model of health service use. Many of the more interesting questions we might ask about differences between Sweden and the United States concern these more complex relationships. Two such questions which we will consider in this chapter are what are the relative effects of social class in the two countries controlling for income and, conversely, what are the relative effects of income in the two countries controlling for social class.

Both the resources of a family and its social class are related to use of health services. The correlation between resources such as family income and use is usually explained in terms of families with more money being able to afford more health services. Social class, as measured by prestige rankings of the occupation of the family head, indicates different life styles and values which may influence health service utilization. In general, higher social class is expected to result in higher consumption of health services.[1]

A major problem in understanding the effects of income and social class arises because the two are highly correlated. People with higher incomes tend to be in the higher social classes and vice versa. Thus, a high correlation between social class and use of medical services is subject to the interpretation that class is simply a substitute for income. Similarly, a strong association between income and use of health services might be explained as showing that higher income persons have attitudes and beliefs about health which lead them to use more health services.

Examining these various possibilities takes on added importance because of the different systems we are studying. Accessibility to hospitals, physicians, and drugs is greater in Sweden than in the United States.

[1] A major exception to this generalization is use of hospital services.

This difference has led us to postulate (c 1) that income should be a better predictor of utilization in the United States than in Sweden. In contrast, there is little third-party payment for dental services for adults in either system. Thus, the influence on dental care should be more similar in the two countries. A more stringent test of the income postulate will be provided by holding social class constant.

We also have postulated (b 1) that the influence of class would be greater in the United States than in Sweden because of the greater size and heterogeneity of the United States. If this postulate is true, class differences between the countries should still be found when income is held constant. Further, the results for Sweden bear directly on the intriguing question of how similar the health patterns of different social classes will become under a system of relatively great accessibility when the effects of personal resources are held constant. More directly, one might ask whether it is enough to alter the system and provide purchasing power to low income persons to equalize distribution or if some additional fundamental change is necessary to stimulate use.

Two subgroups from the samples have been eliminated from the following analysis. All individuals from families headed by persons defined as farmers have been dropped. This was done because of the difficulty of placing farm residents along the class continuum. In addition, the number of farmers and their families was so small as to make separate analysis difficult. Also eliminated are persons 16 to 20. In Sweden income for all persons above 16 is based on the earnings of the respondent and his or her spouse rather than on those of the whole family in which they live. Since this measure gives a negatively biased estimate of relevant income for young Swedish people still living with their parents, the age group 16–20 was eliminated from the analysis in both countries.

The technique which will be used to separate the effects of income and social class requires that each variable be dichotomous.[2] In order to make the class and income variables dichotomous, the middle and upper groups for each variable were combined in each country. These combinations are subsequently referred to as the "high" groups. The dependent variables were already dichotomous, indicating use or nonuse of hospitals, physicians, drugs, and dental care.

EFFECT OF INCOME CONTROLLING FOR SOCIAL CLASS

Table 44 shows the difference in the proportion of high and low income people using health services controlling for class differences. The

[2] The general approach used here was first suggested to the authors by Goodman (1965, pp. 290–301).

first figure in the table could be interpreted as follows: 2.6 percent more of the Swedes in the low income group were admitted to a hospital during the year than were Swedes in the high income group after differences in the social class levels of these groups are taken into account. However, the estimated difference is so small that sampling variation could quite readily account for it. In contrast, the fourth figure in the first column estimates that 4.8 percent more of the Americans in the high income group saw a physician than did Americans in the low income group after social class was controlled for and that this difference is greater than would probably be accounted for by sampling error.

TABLE 44

EFFECT OF INCOME CONTROLLING FOR SOCIAL CLASS

TYPE OF SERVICE	PERCENTAGE DIFFERENCE BETWEEN INCOME GROUPS[a]			
	Total[b]	Age 0–15	21–44	45 and Over
Hospital				
Sweden.....	− 2.6	+ 0.2	+ 1.2	− 7.1*
U.S.....	− 0.1	+ 1.1	+ 0.7	− 2.7
Physician				
Sweden.....	+ 3.0	− 3.3	+ 3.7	+ 6.3
U.S.....	+ 4.8*	+10.5*	+ 3.1	− 0.3
Drugs				
Sweden.....	− 4.6	.....	− 2.1	− 6.5
U.S.....	+ 0.2	.....	+ 5.3	− 5.6
Dental				
Sweden.....	+ 7.8*	.....	0.0	+10.8*
U.S.....	+16.8*	.....	+14.0*	+19.1*

[a] Difference of percentages between high and low income groups using a a service, controlling for social class differences between these groups. A negative percentage difference indicates greater use by the low income group. An asterisk (*) signifies that the percentage difference is more than two times its standard error or roughly significant at the .05 level. A description of the technique used is found in Appendix C, pp. 159–61.

[b] Excludes members of farm families and persons aged 16–20 for all services. For drugs and dental care all persons under 21 are excluded.

The findings are that there are not significant income differences in either country with respect to hospital and drug use. However, higher income people are more likely to see a physician than low income persons in the United States while no such income difference was found in Sweden. Significant income differences were found in both countries regarding dental care. In each case high income persons were more likely to see a dentist than low income persons. It should be noted, however,

that the size of the difference was over twice as large in the United States as in Sweden.

In order to get an idea of how particular age groups are affected by income differences in each country, each sample was divided into children 0–15 and adults 21–44 and 45 and over. The results displayed in Table 44 show that the income difference found for physician use in the U.S. sample is largely the result of differences among children. Children in high income families are considerably more likely to see a physician than low income children even after social class is taken into account. The significant difference in the proportion of persons seeing a dentist for the population as a whole in the United States reflects greater usage by high income adults in both age groups. In Sweden, however, it is only among persons 45 and over that higher income results in greater use. Controlling for social class, there is no difference in the probability of seeing a dentist among persons 21–44 in Sweden by income.

A further look at Table 44 shows that there are some differences for particular age groups not reflected for the population as a whole. First of all, low income adults 45 and over in Sweden are more likely to be admitted to a hospital than are high income adults of the same age. This finding may, in part, reflect the influence of illness on both hospital admissions and income level. While poor health raises the probability of hospital admission, it can also reduce earning potential. A possible consequence is a negative correlation between income and hospital admissions.[3]

EFFECT OF SOCIAL CLASS CONTROLLING FOR INCOME

Table 45 shows that for the U.S. population as a whole there is a significant social class effect for physician care and drugs independent of income which is not found in Sweden. The tendency for people from the higher social class category to seek medical services more often occurs also with dental services but these results are also found for Sweden.

Within each age group in the United States we find those of high social class using more physician services and drugs than those of low social class. For both the United States and Sweden the findings for the population as a whole regarding dental care are replicated for each age group.

Only within Sweden do we find results for particular age groups which differ from the results for the population as a whole. For persons 21–44 there is a negative relationship between social class and hospital admis-

[3] One approach to studying the interaction of illness, income level and medical care utilization is to utilize techniques which adjust income levels for the transitory effects of illness. See Andersen and Benham (1970).

sions. Further, there are significant differences with opposite signs for physician services which cancel one another out when the population as a whole is considered. High social class for Swedish children leads to greater physician use while lower social class among adults 21–44 is associated with higher probability of seeing a physician. The results for Swedish children may indicate a life style and set of values among higher

TABLE 45

EFFECT OF SOCIAL CLASS CONTROLLING FOR INCOME

TYPE OF SERVICE	PERCENTAGE DIFFERENCE BETWEEN SOCIAL CLASS GROUPS[a]			
	Total[b]	Age 0–15	21–44	45 and Over
Hospital				
Sweden.....	0.0	− 0.4	− 5.2*	+ 5.3
U.S.....	− 0.4	− 1.5	− 1.4	+ 2.3
Physician				
Sweden.....	+ 2.0	+ 9.2*	− 9.8*	+ 7.8
U.S.....	+12.6*	+15.6*	+ 9.2*	+12.5*
Drugs				
Sweden.....	+ 0.7	.....	− 1.6	+ 2.8
U.S.....	+ 8.8*	.....	+ 8.7*	+ 9.9*
Dental				
Sweden.....	+17.6*	.....	+14.1*	+18.0*
U.S.....	+15.0*	.....	+14.1*	+14.6*

[a] Difference of percentages between high and low social class groups using a service, controlling for income differences between these groups. A negative percentage difference indicates greater use by the low social class group. Asterisks used as in Table 44.

[b] Excludes members of farm families and persons aged 16–20 for all services. For drugs and dental care all persons under 21 are excluded.

class Swedish adults which causes them to seek more medical care for their children than do lower class Swedes but to not seek such additional services for themselves. The higher physician and hospital use for lower class Swedish adults 21–44 suggests that a system with relatively great accessibility may in fact provide more services to lower class persons under some conditions. This could reflect the system's greater sensitivity to the "needs" of the population and the relatively greater need of lower social class groups.

SUMMARY

The results of the income-class analysis generally support the postulate that income differences would be greater in the United States than in Sweden for physician services. The expected differences for hospital care and drugs were not so apparent. Further, as expected, income played some part in determining dental care in both countries though the difference between high and low income groups was greater in the United States than in Sweden.

Class differences, as postulated, were generally found in the United States but not in Sweden for physician services and drugs. However, class differences in *both* countries were small for hospital services and large for dental services.

Thus, even though accessibility to hospital services was thought to be considerably less in the United States than in Sweden, low income on the whole does not seem to hinder entry to the hospital. However, our findings suggest that, given the present system in the United States, an increase in income for low income groups would result in more low income persons using physician services and dental services. Equalizing income differences might also result in greater use of dentists by adults in Sweden where adults must also pay directly for these services.

Our results seem to imply that differences in income are not responsible for all of the class differences in use of services in the United States. Considerable difference according to class still exists after the effect of income is partialed out. Such class differences do not generally exist in Sweden though higher class children are more likely to see a doctor than those of the low class. The crucial policy question then becomes whether the larger class differences in the United States reflect: (1) the differences in health system between the two countries; (2) more clear cut class distinction in the United States; or (3) some combination of the two. While we suspect there are more clear cut class differences, the results for dental care indicate that health system differences are also important. The fact that there are such large class differences in dental use among Swedes shows that class differences do exist in Sweden which can influence medical care utilization as much as in the United States under some circumstances. Yet, apparently, a change in the system has largely eliminated these differences in other instances (use of drugs).

CHAPTER IX

THE RELATIVE IMPORTANCE OF PREDICTORS OF PHYSICIAN UTILIZATION

In our prior considerations of the effects of predisposing, enabling and need variables on health service utilization, we have concerned ourselves only with basic, simple relationships. Most of the postulates examined in this report include the implicit assumption that other factors are constant. Yet these simple relationships, while informative and necessary as a starting point for more detailed analysis, do not give us sufficient information about the effect of a variable when other factors which also influence utilization are taken into account. Through the age-adjusting of the cross tabulations of Chapters V, VI, and VII we attempted to take into account one additional variable—granted a very basic one—for studies of medical care utilization rates. In Chapter VIII an effort was made to consider the effects of social class and income in addition to age. Still, as our model and previous findings indicate, there are other important determinants of the kind and amounts of medical care people in Sweden and the United States use which, ideally, we would also like to consider.

In this chapter and the following two an attempt will be made to consider simultaneously the effects of the predisposing, enabling, and need variables previously examined separately. Hopefully, such a multivariate analysis will provide us with more information about how medical care is distributed in each country and provide a means for further testing of our postulates about the relative importance of various predictors for medical care utilization in Sweden and the United States.

MULTIVARIATE ANALYSIS

The multivariate analysis technique we have chosen is the Automatic Interaction Detector (AID) approach, especially developed for large scale social surveys of the kind used in this study.[1] This computer program employs a nonsymmetrical branching technique based on analysis of variance. Using as predictors the predisposing, enabling, and "health" variables, it subdivides the sample through a series of dichotomous splits into a series of mutually exclusive subgroups. The purpose is to maximize our ability to predict values of the dependent variables which in our analyses are various kinds of medical care utilization. At each stage of an analysis the predictor is selected which will give a maximum improvement in ability to predict values of the dependent variable. Linearity and additivity assumptions inherent in conventional multiple-regression techniques are not required.

[1] Sonquist and Morgan (1964). See Appendix C for a more detailed description of the AID program.

The AID approach seemed particularly suited to this study because of its emphasis on interaction effects. An interaction effect is found when a variable is an important predictor under some circumstances but not under others. In this study of medical care utilization the illness variables are of prime importance. The amount of illness people experience is a basic determinant of the medical care they will receive according both to common sense and to findings presented earlier in this report. Given the initial importance of illness, the interesting question is what are the subsequent factors which further divide the ill and the non-ill according to the medical care they receive. If different factors determine the behavior of people in poor health and of those in good health, then interaction effects are taking place.[2] From the perspective of systems comparisons, it then becomes important to see if determinants of medical care for people of various health levels differ in these systems. For example, do people in poor health get care regardless of family resources and social characteristics, or is there significant differentiation in the type of medical care they receive according to these characteristics?

The following analyses will consider persons under 21 separately from the rest of the population. One reason for this separation is that we do not have information for all of the variables for children. In addition, the earlier chapters have indicated that the distribution of care differs significantly according to age between Sweden and the United States. Consequently, it seemed appropriate to separate out children and adolescents for special analysis to focus on the question of how the effect of various predictors of utilization might differ between countries according to age group.

Three chapters will be devoted to multivariate analyses. This chapter will consider physician utilization. The next will deal with hospital use. Chapter XI focuses on use of prescribed drugs and dental care. This chapter is divided into two sections. The first considers whether or not physician care was obtained; and the second, number of physician visits.

[2] Such differential behavior has been illustrated in Eichhorn and Andersen (1962), and Andersen and Eichhorn (1964).

INTERPRETATION OF CHARTS AND TABLES

Table 46 provides an overall view of the AID analysis of factors associated with people seeing physicians in Sweden and the United States. Before commenting on the substance of this table, we will make some remarks about the interpretation of the findings which will apply to all the AID tables.

For this and subsequent AID analyses the predictors included in the analysis are given in the first column. Included with each predictor is an indication of whether we initially expected it to be more important in Sweden or the United States and the original postulate developed in Chapter IV from which the hypothesis comes. This designation provides a means for relating the AID analysis to the underlying model, getting some idea of how the AID results fit the postulates, and comparing these results with our earlier interpretation of how the results of the earlier chapters relate to the hypotheses.

The next two columns give us an overall impression of the effect of each variable in each country. The figures shown here are the proportion of the total variance in utilization which could be explained by the predictor in the first stage of the AID analysis. We will subsequently refer to this statistic as the gross B^2. Thus we can tell from these columns that level of health is the most important initial predictor in Sweden, accounting for 7.2 percent of all the variance in the Swedish sample. Similarly, number of symptoms is the most important variable in the first stage of the analysis for the United States, accounting for 6.3 percent of all the variance in the U.S. sample.[3]

The last two columns in Table 46 show the actual use made of the predictor in the multivariate analysis. This statistic will henceforth be called partial B^2. Partial B^2 gives the proportion of total variance in the dependent variable explained by the predictor. Since these values are additive, we can also sum them to arrive at the total variance explained by all the predictors combined. Table 46 shows, for instance, that in the AID analysis the symptoms variable actually accounts for 3.6 percent

[3] There are no estimates for Sweden for race and health insurance since practically all Swedes are white and are covered by compulsory government sponsored health insurance. Further, in both countries there can be only one estimate for two variables, social class and farm/non-farm; farmers and their families are not ranked according to social class. The estimate is given in each country for the division of the sample which is most important. Thus, in Sweden the estimate is made for farm/non-farm because the analysis of variance indicated that there were greater differences between farmers and the other social classes combined than between any possible separation including farmers with any social class group. In contrast, in the United States the analysis showed that farmers and the lower class were similar to each other and different from the higher social classes, so the estimate in Table 46 is made for social class rather than for farm/non-farm.

of the variance in Sweden and 7.3 percent of the variance in the United States. Further, all the predictors accounted for 15.8 percent of the variance in Sweden and 9.8 percent of the variance in the United States.[4]

TABLE 46

RELATIVE IMPORTANCE OF VARIABLES PREDICTING PHYSICIAN CARE AMONG PERSONS 21 AND OVER

PREDICTOR	IMPORTANCE, NOT CONSIDERING OTHER VARIABLES[a]		IMPORTANCE IN MULTIVARIATE ANALYSIS[b]	
	Sweden n=1776	U.S. n=4454	Sweden n=1776	U.S. n=4454
Demographic				
(s a 1)[c] Age	.006	.001	.016	
(s a 1) Sex	.014	.014		
(s a 1) Marital status	.005	.005		
Social structure				
(u b 1) Family size	.002	.002		
(u b 1) Education	.010	.003	.011	
(u b 1) Social class [d]		.014	.010	.006
(s b 2) Farm/non-farm [d]	.011			
(u b 1) Race	—	.007		
Family resources				
(u c 1) Income	.005	.004	.013	.007
(u c 1) Health insurance	—	.018		.012
Community resources				
(u d 1) Region	.000	.001		
(s d 2) Residence	.008	.000		
Perceived Illness				
(s e 1) Symptoms	.068	.063	.036	.073
(s e 1) Level of health	.072	.025	.072	
Total[e]			.158	.098

[a] Gross B^2 or the maximum proportion of variance which could be explained by predictor by one split of the first group into two subgroups (see Appendix C., p. 163).

[b] Partial B^2 or the actual proportion of variance explained by predictor in AID analysis, (see Appendix C, p. 164). Blank indicates variable was not used in the AID analysis.

[c] The first letter in parenthesis ( ) refers to the country in which the variable was expected to be most important: s = Sweden, u = U.S., — = no difference postulated. The second letter and the number refer to the specific postulate given in Chapter IV. A summary of the postulates is found in Table 13, p. 40.

[d] The predictor *Social class* is divided into four subgroups: low, medium, high, and farmer. When a split occurred separating farmers from all other social class groups, the explained variance was assigned to Farm/non-farm with Social class left blank. In all other cases, when farmers were included with other social classes in the split, social class factors are assumed to be the overriding ones and Farm/non-farm is left blank.

[e] The total variance explained by all predictors used in AID analysis (see Appendix C, p. 164).

[4] This statistic corresponds roughly to the multiple R^2 in a multiple regression.

Some predictors account for no variance. This means that at every stage of the analysis some other variable was more important.

The fact that a variable is not used does not necessarily mean that it is not important. For instance, level of health has the second highest gross B^2 for the U.S. sample, yet it is not used in the AID analysis. Such a result suggests that the variance that could have been explained by health level is actually accounted for by some other variable in the analysis. Looking at the partial B^2's it appears that number of symptoms is probably substituting for health level in this case. Other output from the program not published in this report allows us to detect such substitutions. In presenting our findings we will attempt to note important substitutions. The reader can surmise that substitutions are involved whenever the gross B^2 is relatively high but the predictor accounts for none of the variance in the actual AID analysis.

The AID program will continue to make splits until certain minimum requirements are no longer met by any of the subgroups of the sample. These requirements serve the same function as significance levels in more standard type analyses. The particular requirements and the levels used in this study are discussed in Appendix C.

An important point to note is that the unweighted sample size for both persons 21 and over and those under 21 is larger in the United States than in Sweden. Further, the Swedish sample is weighted. The probability of splits taking place is inversely related to sample size given the same split requirements, and weighting serves to increase the probability of splits. The outcome of these sample characteristics is that, apart from differences in the explanatory power of the predictors, more variance would probably be explained in Sweden. Since we are interested in making direct comparisons between the results in the two countries, it was necessary to take this into account somehow. Our solution was to increase the split criteria in Sweden relative to the United States according to a function described in Appendix C. As a result we feel direct comparison is possible.[5] In addition, we feel that the comparisons of the relationships of predictors are at least as important as the total variance explained. For instance, it is important to find out not only if demographic variables explain more of the actual variance in Sweden than in the United States but also if they are relatively more important than other predictors in one country than in the other.

[5] It should be noted, however, that, even with the increase, there is still some bias toward more variance being explained by a single split in Sweden. This is simply a function of the smaller sample size in Sweden. This means that the difference between the value of the dependent variable for a given observation and the mean value will, on average, be larger in Sweden than in the United States. Consequently, we will be cautious in our interpretations and the reader should be aware of this possible bias toward larger explained variances in Sweden.

In addition to the summary tables for each AID analysis, predictor trees will also be presented. These trees show the actual splits that account for the partial B^2 and the composition of the resulting sub-groups. They illustrate at each stage of the analysis what the most important predictor was and further give us an overall visual comparison of the important predictors in each country. Thus in Chart 2 we see that health level is the most important predictor in the first stage of the analysis for Sweden. It divides the sample into people in fair or poor health (group 2), 87 percent of whom see a doctor, and people in good health (group 3), 60 percent of whom see a doctor. No predictor is able to account for sufficient variance to split the "in between" and poor health group. However, people in good health are then divided into those with no symptoms (group 4) and those with one or more symptoms (group 5). Of the former group 46 percent saw a doctor while 68 percent of those with one or more symptoms saw a doctor. Subsequent splits on the resulting groups are then made according to education (groups 6 and 7) and income (groups 8 and 9). In the same fashion we could go on describing the predictors used and the resulting sub-groups for each tree. However, these examples should be sufficient for the reader to follow the details of any tree for himself.

PHYSICIAN CARE

Persons 21 and Over.

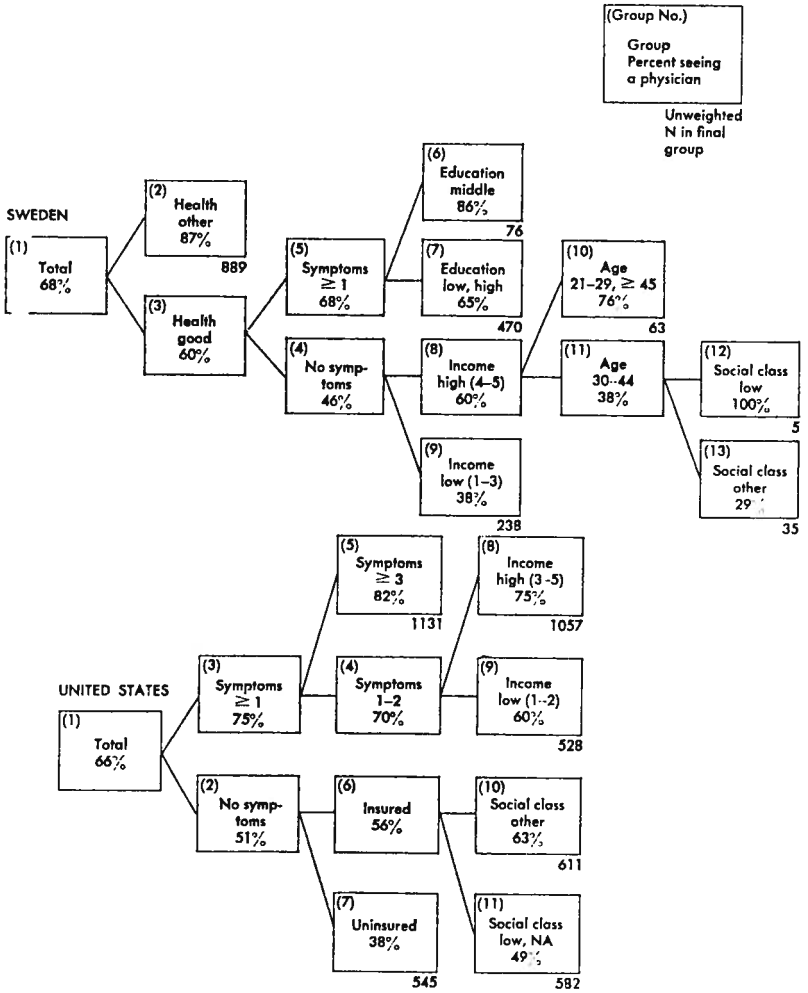
Turning now to the findings, Chart 2 shows that illness is the most important predictor of who will see a doctor in both countries for persons 21 years of age and over. In Sweden, both level of health and symptoms reported are used to separate people who saw a doctor from those who did not. In the United States only the symptoms variable is used. For the group in poorest health, in both countries no other predictor accounts for sufficient variance to cause a split. This suggests that for the sickest people in both countries the decision whether or not to see a doctor is made largely independently of predisposing and enabling characteristics.

The main difference between the countries concerning the "health" variables seems to be the higher predictive power in Sweden. Table 46 shows that the two health variables together accounted for almost 11 per cent of the variance in Sweden compared to slightly over seven per cent of the variance in the United States. The same conclusion can be pre-

sented another way by noting in Chart 2 that the difference in per cent of people seeing the doctor between the best health group (4) and the worst health group (2) is 41 percentage points (87–46) in Sweden, while the difference between the best health group (2) and the worst health group (5) is 10 percentage points less (82–51) in the United States.

CHART 2

PREDICTOR TREES FOR ANALYSIS OF PHYSICIAN CARE AMONG PERSONS 21 AND OVER



After taking into consideration the importance of health in the initial stages of the analyses, the AID technique shows that social structure plays a role in determining who will see a doctor in both countries among people reporting better health and fewer symptoms. Without exception we find in the U.S. tree that more family resources and higher social class are associated with a higher probability of seeing a doctor. Thus in the upper portion of the tree, among people with one or two symptoms, 75 percent of those with higher incomes saw a doctor (group 8) compared to 60 percent of those with lower incomes (group 9). In the lower section of the tree, made up of people without symptoms, 56 percent of the insured saw a doctor compared to 38 percent of those without insurance. Further, among the insured, those of high or middle social class were more likely to see a doctor than the lower social class.

In Sweden, on the other hand, more education and family resources are not always associated with higher physician use. While Chart 2 shows that among people with no symptoms, 60 percent of the high income group (group 8) see a doctor compared to only 38 percent of the low income group (group 9), it also shows that among people with symptoms, people with middle education are more likely to see a doctor than people with *higher* as well as lower education. Further, we see later in the tree that a lower social class group has a higher percentage of people seeing a doctor than the higher social class group (groups 12 and 13).

It is also interesting to note from Table 46 and Chart 2 that a demographic variable, age, is a strong enough predictor to be used in the Swedish analysis but no demographic predictor is used in the U.S. analysis. This split in Sweden shows that for people in good health with no symptoms and a high income the youngest and the oldest are more likely to see a doctor than those aged 30 to 44. The high use by the group aged 21 to 29 is, in part, accounted for by women receiving prenatal and postnatal care. After 45, the general phenomenon of increasing need with increasing age is probably making itself felt.

Persons Under 21

Table 47 shows that certain variables are not included in the analysis of persons under 21. The health variables are not included because such information was not available for Swedish children 16 and under. The education variable is not included because the measure is the educational attainment of the individual and is not meaningful for persons still attending school. We expected that because of these exclusions, particularly of the health variables, the demographic variables would become more important in the AID analysis of persons under 21 compared to that

for persons 21 and over since these are most closely related to the excluded need variables.

A comparison of the two trees in Chart 3 and examination of explained variance in Table 47 shows that the most important variable is

TABLE 47

RELATIVE IMPORTANCE OF VARIABLES PREDICTING PHYSICIAN CARE AMONG PERSONS UNDER 21[a]

PREDICTOR	IMPORTANCE, NOT CONSIDERING OTHER VARIABLES		IMPORTANCE IN MULTIVARIATE ANALYSIS	
	Sweden n=1030	U.S. n=3257	Sweden n=1030	U.S. n=3257
Demographic				
(s a 1) Age	.040	.030	.040	.027
(s a 1) Sex	.002	.000		
(s a 1) Marital status	.002	.001		
Social Structure				
(u b 1) Family size	.031	.045	.027	.023
(u b 1) Social class	.009	.035		
(s b 2) Farm/non-farm				
(u b 1) Race	—	.046		.046
Family resources				
(u c 1) Income	.005	.034		.015
(u c 1) Health insurance	—	.036		
Community resources				
(u d 1) Region	.001	.019		.017
(s d 2) Residence	.010	.006		
Total			.067	.128

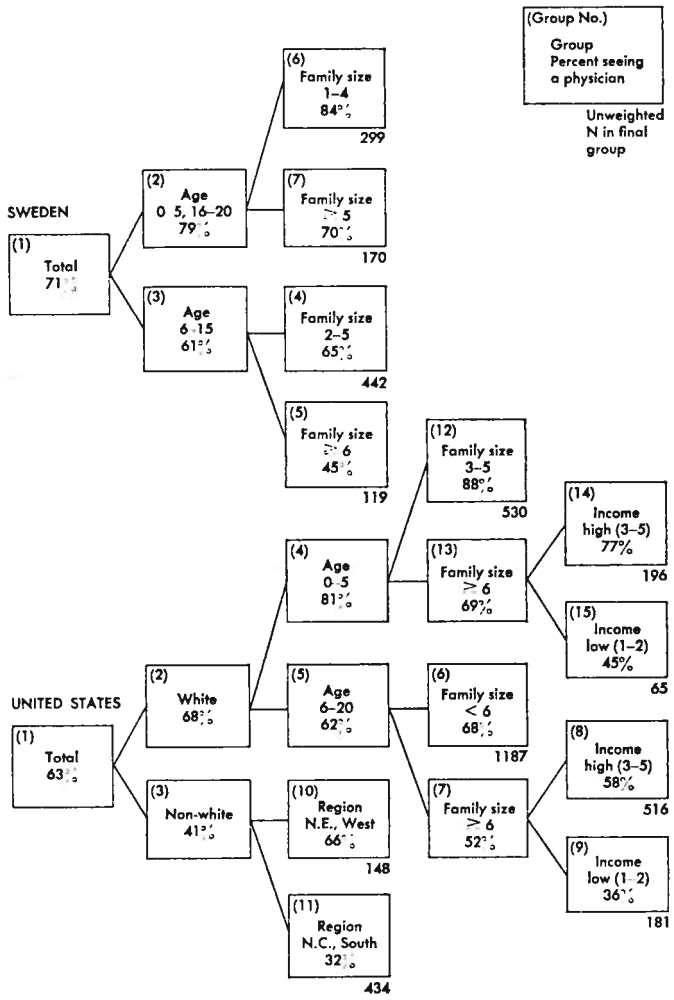
[a] For definitions of terms and symbols, see Table 46, p. 91.

quite different in the two countries. For Sweden it is age, with children under 6 and adolescents 16 to 20 being more likely to see a doctor than children 6 to 15. These results reflect the common "U shaped" curve found so often when use is plotted against age. The youngest children are more likely to receive services than older children, but beginning with young adulthood use of services begins to increase again—an increase that tends to continue throughout life.

In contrast to the initial importance of demographic variables in Sweden, a social structural variable is most important in the United States. Chart 3 shows that 68 percent of all white young persons saw a doctor (group 2) while only 41 percent of the non-white did so (group 3). The tree for the United States shows further that for non-white young

CHART 3

PREDICTOR TREES FOR ANALYSIS OF PHYSICIAN CARE AMONG PERSONS UNDER 21



people region seems to make considerable difference. Those in the North East and West were almost as likely as white young people to see a doctor while those in the North Central and South were much less likely to see a doctor (groups 10 and 11).

The first portion of the white person's section of the tree is very similar

to the total tree for Sweden. Young children 0 to 5 are more likely to see a doctor than older young persons 6 to 20. The only difference here from the first split for Sweden is that the age group 16 to 20 combines with the older group rather than the young children (groups 4 and 5).

The uniform effect of family size is then shown in both countries. For each age group in each country young persons living in smaller families are more likely to see a doctor than those living in larger families. The analysis for young persons differs considerably from that for the rest of the population in both countries in this respect. Family size, which had little effect on who among persons 21 and over saw a doctor, is found to be a very important predictor of who will see a doctor among those under 21.

The final branches of the tree for the United States show the importance of enabling resources for children in large families. For both the younger and older youngsters living in large families income has a major impact on whether or not they will see a doctor. For instance, for white children 0 to 5 living in families of six or more, 77 percent of those in higher income families saw a doctor compared to only 45 percent of those in lower income families (groups 14 and 15). Similarly, for white young people 6 to 20 living in families of six or more 58 percent of those from higher income families saw a doctor compared to 36 percent of those from lower income families (groups 8 and 9). It should be noted that income does not enter the analysis for either age group living in smaller families. These results indicate that income is particularly important as an enabling resource for children in large families and evidently less important in determining who will see a doctor in smaller families.

Results for Physician Care in Relation to Postulates

In summarizing the results of the AID analysis for each kind of utilization, we will relate our findings explicitly to the distributional postulates of the study. Postulate (a 1) that demographic variables would be more important in Sweden than in the United States receives some support as age seems to be a somewhat better predictor in Sweden than in the United States of who will see a doctor among both persons under 21 and those 21 and over. There appeared to be little difference in the effects of sex and marital status in the two countries.

Postulate (b 1) that social structural variables would be more important in the United States received some support in that race was the most important predictor of which young people would see a doctor in the United States and in that social class was used in the analysis for adults. Some social structure effects for Swedes 21 and over were also

noted. However, the direction of the relationships was not what normally might be expected. That is, the lower social class and the middle education group turned out to be the groups most likely to see a doctor rather than the highest groups for each variable. Further, family size was found to be important in Sweden as well as in the United States regarding which young people would see a doctor.[6]

Postulate (c 1) that family resources would be more important in the United States was generally supported, although it should be noted that some income effects among persons 21 and over were noted in Sweden. In this case, the higher income group was the higher utilizer.

Postulate (d 1) was that region would be more important in the United States than in Sweden. This postulate was supported in that region was used in the analysis of persons under 21 for the United States but not for Sweden. The residence hypothesis (d 2) was that the urban–rural distinction would be more important in Sweden than in the United States. While residence was not used in the AID analysis, the gross B^2's show that the variable was more important in Sweden than in the United States.

Finally, postulate (e 1) that "health" variables would be more important in Sweden than in the United States was supported although the symptoms variable appeared important in the United States as well as in Sweden. However, the level of health variable was more important in Sweden than in the United States.

NUMBER OF PHYSICIAN VISITS

In the remainder of the chapter we will consider the volume of physician care received by those people who saw a doctor at least once during the survey year. Since we are excluding from the analysis people who did not see a doctor at all, this analysis is intended to give us some idea about what factors influence the quantity of physician services received by people after they have gained access to the system.

Persons 21 and Over.

Table 48 and Chart 4 emphasize the importance of perceived health in both Sweden and the United States. This predictor has by far the largest B^2's in Table 48, and, further, each of its classes is separated in the AID analysis as shown in Chart 4. Thus, we find in Sweden that people reporting poor health averaged 8.6 visits (group 4), those reporting "in

[6] It might also be noted that while the farm/non-farm distinction was not used for a split in any of the AID analyses, it was the most important first division among the social classes for adults in Sweden but not in the United States (see the gross B^2, Table 46). While these relationships are not conclusive, their direction is suggested by postulate (b 2); i.e., farm/non-farm differences will be greater in Sweden.

between" health had a mean of 4.8 visits (group 5), and those with good health had a mean of 2.9 visits. Similarly, in the United States we find a range from a mean of 15.4 visits for people reporting poor health (group 6) down to a mean of 4.8 visits for persons reporting excellent health (group 5).

TABLE 48

RELATIVE IMPORTANCE OF VARIABLES PREDICTING NUMBER OF PHYSICIAN VISITS BY PERSONS 21 AND OVER[a]

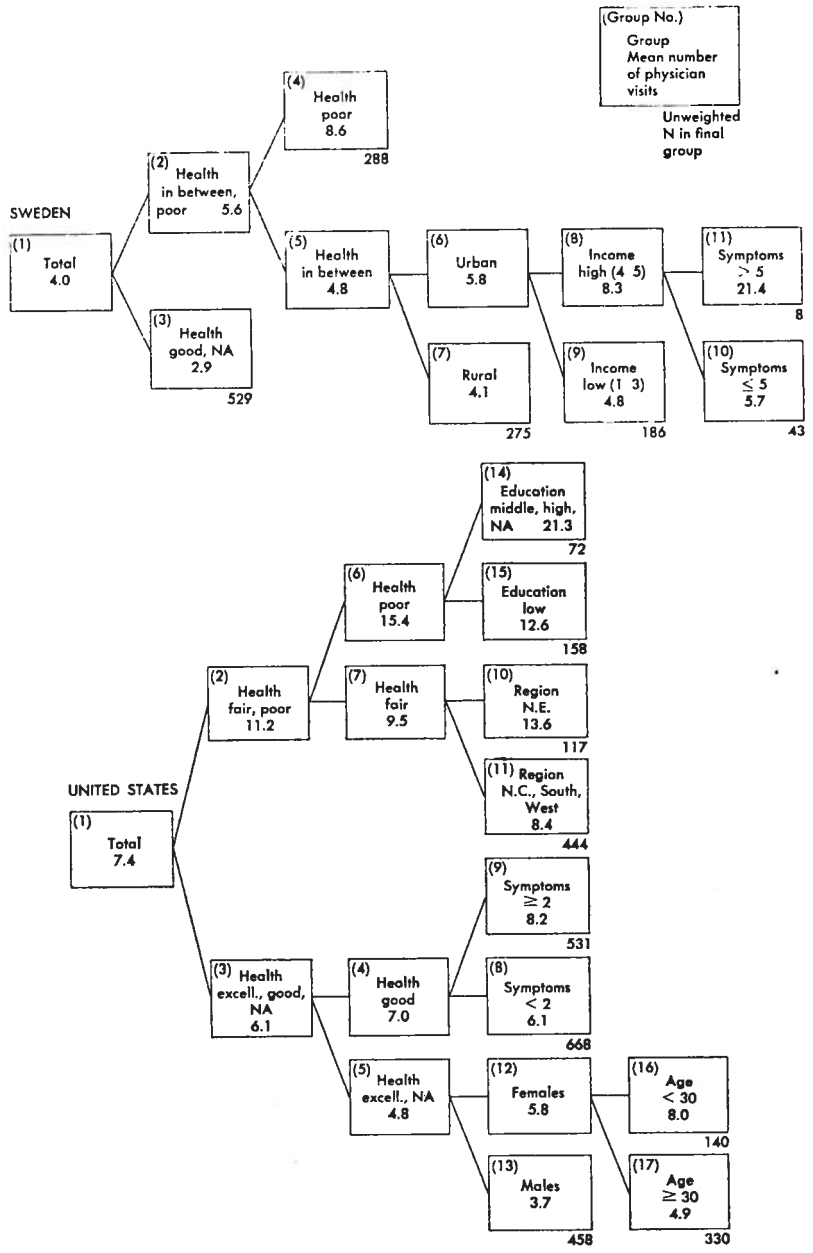
PREDICTOR	IMPORTANCE, NOT CONSIDERING OTHER VARIABLES		IMPORTANCE IN MULTIVARIATE ANALYSIS	
	Sweden n=1329	U.S. n=2918	Sweden n=1329	U.S. n=2918
Demographic				
(s a 1) Age	.013	.007		.007
(s a 1) Sex	.002	.013		.007
(s a 1) Marital status	.008	.004		
Social structure				
(u b 1) Family size	.006	.002		
(u b 1) Education	.001	.001		.008
(u b 1) Social class	.011	.002		
(s b 2) Farm/Non-farm				
(u b 1) Race	—	.000		
Family resources				
(u c 1) Income	.003	.004	.012	
(u c 2) Health insurance	—	.000		
Community resources				
(u d 1) Region	.011	.005		.006
(s d 2) Residence	.020	.000	.014	
Perceived Illness				
(s e 1) Symptoms	.069	.058	.026	.008
(s e 2) Level of health	.120	.067	.171	.104
Total			.223	.140

[a] For definitions of terms and symbols, see Table 46, p. 91.

While the behavior of the people in the two countries is quite similar with respect to level of health, Chart 4 shows many other differences between them. In Sweden, no other variable is important enough to further divide people in poor health and those in good health. Splits occur only for people whose health is "in between." In contrast, some other characteristic is important enough to further subdivide people in each health group in the United States. In addition, the variables that account for the new groups differ in the two countries.

CHART 4

PREDICTOR TREES FOR ANALYSIS OF NUMBER OF PHYSICIAN VISITS BY PERSONS 21 AND OVER



In Sweden residence and family resources and symptoms differentiate people of "in between" health. Those living in urban areas have more visits than those residing in rural areas (groups 6 and 7). Further, among those in urban areas the high income people have more visits than the lower income groups (groups 8 and 9).

In the United States we find a combination of social structural, regional, health and demographic variables accounting for further variance in the different health groups. Having a higher education, living in the North East and experiencing two or more symptoms results in more visits for persons in health categories other than excellent. The demographic splits among persons in excellent health seem to tell a story about the importance of maternity care in understanding volume of physician services delivered in the United States. First, among people in excellent health, women are shown to have more mean visits than men (groups 12 and 13). Then we find that women under 30, in the prime child bearing age, average three more visits a year than do older women (groups 16 and 17). Further the mean for older women is only 1.2 visits higher than the mean for all men. These results suggest that pregnancy is not necessarily related to a lower perceived health level but does certainly result in much higher physician use rates for women in the child bearing age groups. The same can no doubt be said for Sweden. The question raised by our results, however, concerns whether our conclusions are *as* true for Sweden as for the United States.

Persons Under 21

In Table 49 and Chart 5 two differences are readily apparent. First, among persons under 21, age seems to be a better predictor of number of physician visits in Sweden than in the United States. Second, marital status is important in the United States but not in Sweden.

Thus, in Sweden the initial division shows the common pattern of the youngest and oldest experiencing more visits than children 6 to 15 (groups 2 and 3). In contrast, the most important dichotomy in the United States shows the married having many more visits than the never married (groups 2 and 3). Groups 6 and 7 show that it is the girls who have the high use rate. Further, in groups 8 and 9 we find it is the young married girl living in a family of three or more who has the very high rate. This group consists largely of mothers with babies and young children, who in some instances are expecting more. One reason no similar pattern is found in Sweden is the higher age at marriage in that country. Girls under 21 are less likely to be married or bearing children and, subsequently, do not have high physician utilization rates.

TABLE 49

RELATIVE IMPORTANCE OF VARIABLES PREDICTING NUMBER OF PHYSICIAN VISITS BY PERSONS UNDER 21[a]

PREDICTOR	IMPORTANCE, NOT CONSIDERING OTHER VARIABLES		IMPORTANCE IN MULTIVARIATE ANALYSIS	
	Sweden n=678	U.S. n=2054	Sweden n=678	U.S. n=2054
Demographic				
(s a 1) Age	.022	.010	.022	
(s a 1) Sex	.000	.000		.007
(s a 1) Marital status	.000	.020		.020
Social structure				
(u b 1) Family size	.022	.016	.035	.019
(u b 1) Social class		.003		
(s b 2) Farm/Non-farm	.004			
(u b 1) Race	—	.000		
Family resources				
(u c 1) Income	.001	.001		
(u c 1) Health insurance	—	.002		
Community resources				
(u d 1) Region	.019	.002		
(s d 2) Residence	.010	.002		
Total			.057	.046

[a] For definitions of terms and symbols, see Table 46, p. 91.

The rest of the results from the AID analysis in the two countries are very similar. Chart 5 shows that for both age groups in Sweden and for the never married in the United States, family size is an important determinant of number of visits made. In each instance young people in larger families have, on average, considerably fewer visits than those living in smaller families.

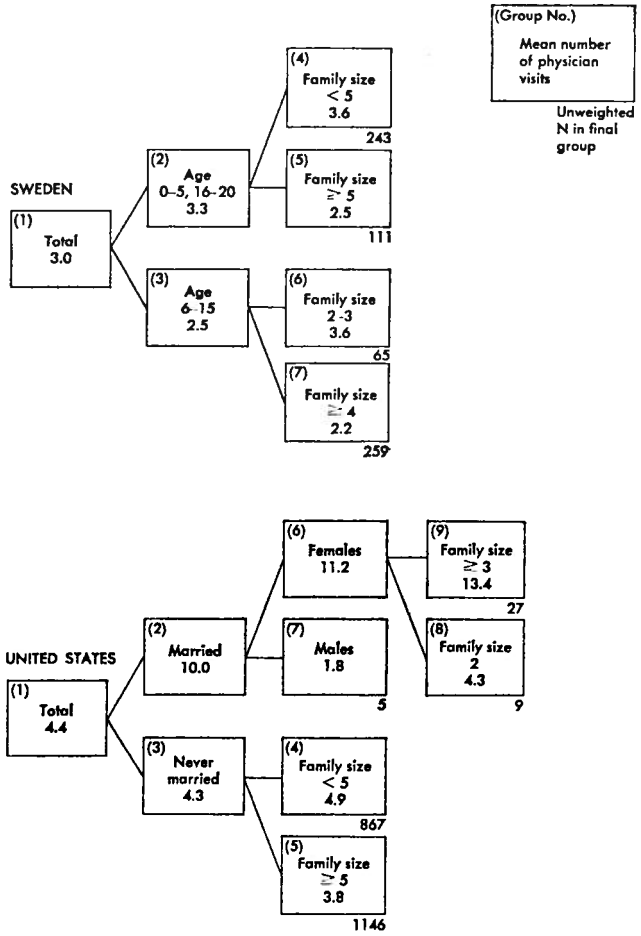
Results for Number of Physician Visits in Relation to Postulates

Postulate (a 1) that demographic variables would be more important in Sweden than the United States does not appear to be clearly supported for either age group. Among persons under 21, the first division of the sample in the AID analysis for Sweden was on age in keeping with our general expectations. Sex and marital status were used in the corresponding U.S. analysis. However, both age and sex were used in the U.S. AID analysis for persons 21 and over while none of these variables were used in the Swedish AID analysis for adults.

The above results indicate that under certain circumstances demo-

CHART 5

PREDICTOR TREES FOR ANALYSIS OF NUMBER OF PHYSICIAN VISITS BY PERSONS UNDER 21



graphic variables are better predictors of number of physician visits in the United States than in Sweden. The circumstances generally seem to be associated with maternity care and related utilization patterns. Young women in the United States are differentiated more from the rest of the population in their use of physicians than are young women in Sweden. Contributing to this difference seems to be younger age at marriage and

higher birth rates in the United States. Further, it may be that pregnancies result in more physician visits by pregnant women relative to the rest of the population in the United States than is true in Sweden.[7]

The importance of family size for young persons in both Sweden and the United States is not in keeping with our postulate (b 1) that social structural variables would be more important in the United States. The implication of our results is that children in large families receive less physician care in Sweden as well as in the United States despite the greater accessibility of the Swedish system.

In general, the other social structural variables appear relatively unimportant as predictors in both countries. Education is the only one actually used in the AID analysis. Its use is in keeping with the postulate, since it is found in the U.S. tree (Chart 4) showing people in poor health in the United States receiving more visits if they have relatively high educational attainment. In addition, while no divisions are actually made between farmers and non-farmers, Table 49 shows that such a division would be more important in Sweden than the United States as we expected from postulate (b 2).

Family resources, like most social structural variables, do not appear very important for predicting number of physician visits in either country. Contrary to postulate (c 1), the only time family income is found in a predictor tree it is found for Sweden and shows that urban people with "in between" health see a physician more often if they have higher incomes (Chart 4). In both countries the social structural and family resource variables seem to be considerably stronger indicators of who will see a doctor than they are as indicators of how many visits people will have once they have come in contact with a physician.

Considering community resources, the findings generally supported postulate (d 2) that the urban-rural distinction would be more important in Sweden than in the United States (Chart 4). While the gross B^2's are higher for region in Sweden than in the United States, the only regional differences that show up in the AID analyses are in the United States (Chart 4). The latter result supports postulate (d 1) that regional differences would be more important in the United States.

The final relevant postulate (e 1) suggested that level of health would be a better predictor in Sweden than in the United States. The health variables were, in fact, very important in both countries. With respect to relative importance, Table 48 suggests that they might be more important in Sweden because they account for more of the total variance in that country.

[7] One reason for this difference is the use of midwives for prenatal care in Sweden.

CHAPTER X

THE RELATIVE IMPORTANCE OF PREDICTORS OF HOSPITAL UTILIZATION

In this chapter we will examine the determinants of who gets into the hospital and how long those who do so stay. The analysis of fact of hospital admission includes analyses of both those 21 and over and those under 21. The analysis of number of hospital days is limited to adults 21 and over.

HOSPITAL CARE

Persons 21 and Over

An initial impression gathered from examination of the gross B^2's in Table 50 is that health is the only important predictor of who will enter a hospital in either country. No predictors aside from symptoms and level of health account for so much as one percent of the variance. However, if we look at the partial B^2's and the predictor trees (Chart 6), it becomes apparent that, while health is by far the most important determinant of who will enter a hospital, there are other relatively important considerations in both countries.

Chart 6 shows that the first two divisions in the AID analyses in both countries are according to level of health. The strength of this predictor is seen as we note in Sweden that 43 percent of the people who reported their health as poor entered the hospital at least once during the survey year (group 4) compared to only two percent of those people who reported their health as good (group 3). Similarly, in the United States 33 percent of the people reporting poor health went to the hospital (group 2) compared to only four percent of those with excellent health (group 5).

There is some indication that health is a stronger predictor in Sweden if we look at the difference between the best and worst health groups in each country. In Sweden there is a 41 percentage point difference while in the United States the difference is 29 percentage points.

After taking health into account, Chart 6 shows that social and economic considerations seem to enter the picture. In both countries, relatively few people in the best health categories enter a hospital (mater-

TABLE 50

RELATIVE IMPORTANCE OF VARIABLES PREDICTING HOSPITAL CARE AMONG PERSONS 21 AND OVER*

PREDICTOR	IMPORTANCE, NOT CONSIDERING OTHER VARIABLES		IMPORTANCE IN MULTIVARIATE ANALYSIS	
	Sweden n=1776	U.S. n=4454	Sweden n=1776	U.S. n=4454
Demographic				
(s a 1) Age	.007	.004		
(s a 1) Sex	.004	.000		
(s a 1) Marital status	.004	.001		
Social structure				
(u b 1) Family size	.004	.002		
(u b 1) Education	.003	.003		
(u b 1) Social class	.003		.012	
(s b 2) Farm/Non-farm		.001		
(u b 1) Race	—	.003		
Family resources				
(u c 1) Income	.004	.001	.010	
(u c 1) Health insurance	—	.006		.019
Community resources				
(u d 1) Region	.002	.001		
(s d 2) Residence	.001	.001		
Perceived illness				
(s e 1) Symptoms	.034	.024		
(s e 1) Level of health	.114	.042	.153	.054
Total			.175	.073

* For definitions of terms and symbols, see Table 46, p. 91.

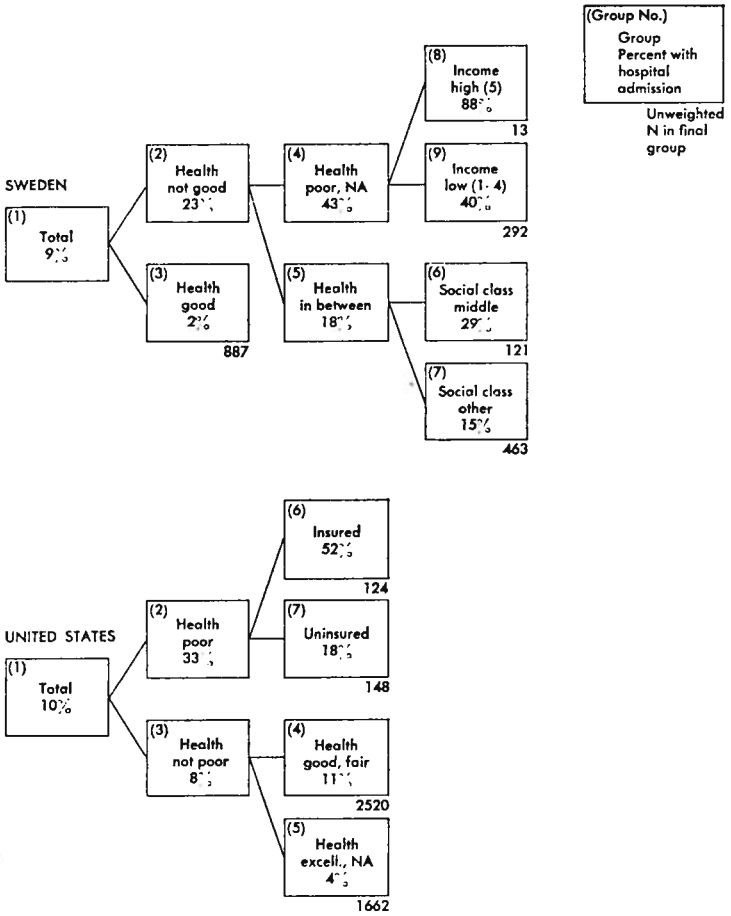
nity admissions are excluded from this analysis), and consequently little else distinguishes among them. However, among people in poor health in Sweden those in the highest income group are over twice as likely to enter a hospital as people from the lower income groups (groups 8 and 9). Similarly, in the United States among people in poor health, those with insurance are almost three times as likely to enter a hospital as the uninsured (groups 6 and 7). Social class further distinguishes among people with "in between" health in Sweden (groups 6 and 7). The relationship is non-monotonic in that the middle class is more likely to enter a hospital than either the higher or lower classes (groups 6 and 7).

Persons Under 21.

The most striking conclusion gained from looking at Table 51 is the absence of correlation for both countries between the predictors and who

CHART 6

PREDICTOR TREES FOR ANALYSIS OF HOSPITAL CARE AMONG PERSONS 21 AND OVER



will go to a hospital. With the health variables not included in the analyses for persons under 21, we find no predictor strong enough to enter the AID analysis in either Sweden or the United States (Table 51). Thus, there is no corresponding chart for this analysis.

The strongest gross B^2's found in Table 51 are those for social class and income in Sweden. An examination of the primary data sources not published in this report shows that the higher income and social class

TABLE 51

RELATIVE IMPORTANCE OF VARIABLES PREDICTING HOSPITAL CARE AMONG PERSONS UNDER 21[a]

PREDICTOR	IMPORTANCE, NOT CONSIDERING OTHER VARIABLES		IMPORTANCE IN MULTIVARIATE ANALYSIS[b]	
	Sweden n=1030	U.S. n=3257	Sweden n=1030	U.S. n=3257
Demographic				
(s a 1) Age	.002	.002		
(s a 1) Sex	.005	.001		
(s a 1) Marital status	.001	.000		
Social structure				
(u b 1) Family size	.003	.000		
(u b 1) Social class	.007	.000		
(s b 2) Farm/Non-farm				
(u b 1) Race	—	.003		
Family resources				
(u c 1) Income	.010	.002		
(u c 1) Health insurance	—	.002		
Community resources				
(u d 1) Region	.002	.003		
(s d 2) Residence	.001	.002		
Total				

[a] For definitions of terms and symbols, see Table 46, p. 91.
[b] No variable met the split reducibility criteria of the AID analysis in either country.

persons are less likely to enter a hospital than the rest of the young population in Sweden.[1]

Results from Hospital Care in Relation to Postulates

Any summary in terms of the general postulates of this study about differences between countries must be prefaced with the reminder that, in general, health is a very strong predictor and other predictors are relatively weak in both countries. With this in mind we might note that the demographic variables were not used at all. Thus, no support is provided for postulate (a 1). Our expectations that the social structure variables would generally be more important in the United States and that the farm/non-farm distinction would be more important in Sweden were not supported (postulates b 1 and b 2). Our expectations that family resources would be more important in the United States than in Sweden (postulate c 1) received some support from Chart 6 which

[1] It should be remembered that we have not controlled for illness in this case.

indicates that people in poor health in the United States were much more likely to enter the hospital if they carried health insurance.[2] The results reveal little about the community postulates (d 1 and d 2) because of the relatively small effect of community resources in both countries. Finally, as we previously noted, while health is of primary importance in both countries, it does appear to be a better predictor of who will enter a hospital in Sweden than in the United States as predicted in postulate (e 1).

NUMBER OF HOSPITAL DAYS

How a respondent ranks his general health level is not only the best predictor we have of whether or not he will enter a hospital but is also most highly correlated with the number of days he will spend in the hospital during the year. Chart 7 shows that people who report themselves to be in poor health spend many more days in the hospital in both Sweden and the United States than do people who do not report poor health.[3]

The similarities between the predictor trees in Chart 7 seem to end after the importance of health is noted. In Sweden, for both people in poor health and those in other health categories we find that persons 65 and over have many more days in the hospital than younger persons. In contrast, in the United States for people in poor health the widowed and divorced spend a considerably longer time in the hospital than the single and married. Further, for people not in poor health, non-whites are shown to spend more time in the hospital than do whites.

The apparent differences in the upper sections of the trees for the two countries can be explained in part by substitution effects. Thus, the split according to marital status in the United States (groups 8 and 9) also served to distinguish younger people from older people since the widowed and divorced group has a considerably higher mean age than does the married and single group. Conversely, we note in Table 52 that marital status is a quite important predictor of number of hospital days in Sweden and, in fact, would have been used to differentiate people in poor health if age had not been used.

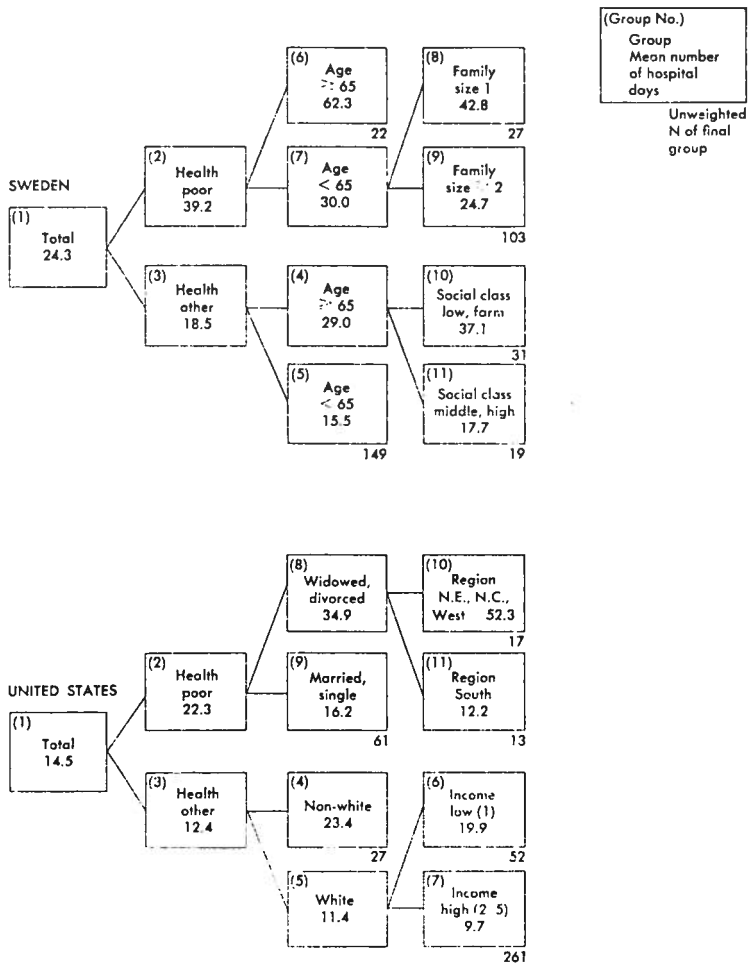
The differences in the lower sections of the trees seem to suggest more basic differences between the countries. While a demographic variable is

[2] Family income also differentiated among people in poor health in Sweden, but the effect of insurance in the United States appears stronger than the effect of income in Sweden.

[3] It should be noted that the split criterion for the AID analysis in the United States was doubled to .012 to compensate for the fewer number of observations in the analysis of hospital days. The criterion for Sweden was correspondingly increased. See Appendix C for a description of this process.

CHART 7

PREDICTOR TREES FOR ANALYSIS OF NUMBER OF HOSPITAL DAYS AMONG PERSONS 21 AND OVER



used in Sweden (age), a social structural variable which is not even relevant in Sweden (race) is the most important predictor of number of hospital days in the United States.

We do note, however, that for persons 65 and over (groups 10 and 11), class differences are found in Sweden as well. Among the white

population in the United States, level of income is correlated with number of hospital days. Those in the lowest income group spend almost as much time in the hospital as the non-whites while the higher income whites spend considerably less time. The most intriguing observation to be

TABLE 52

RELATIVE IMPORTANCE OF VARIABLES PREDICTING NUMBER OF HOSPITAL DAYS BY PERSONS 21 AND OVER[a]

PREDICTOR	IMPORTANCE, NOT CONSIDERING OTHER VARIABLES		IMPORTANCE IN MULTIVARIATE ANALYSIS	
	Sweden n=351	U.S. n=431	Sweden n=351	U.S. n=431
Demographic				
(s a 1) Age	.106	.019	.095	
(s a 1) Sex	.000	.001		
(s a 1) Marital status	.069	.038		.019
Social structure				
(u b 1) Family size	.053	.011	.024	
(u b 1) Education	.005	.008		
(u b 1) Social class	.004		.026	
(s b 2) Farm/Non-farm		.006		
(u b 1) Race	—	.018		.014
Family resources				
(u c 1) Income	.059	.025		.016
(u c 1) Health insurance	—	.016		
Community resources				
(u d 1) Region	.003	.003		.036
(s d 2) Residence	.019	.000		
Perceived illness				
(s e 1) Symptoms	.018	.015		
(s e 1) Level of health	.113	.045	.113	.045
Total			.258	.130

[a] For definitions of terms and symbols, see Table 46, p. 91.

made about these final splits is that, in both countries, the social structural and family resource variables used show that the lower class and income groups spend the most time in the hospital. It is sometimes suggested that this results in the United States because the lower class people coming into the hospital are sicker and require more care. Whatever the reason, the similar results for Sweden hint that the same phenomenon might be at work despite fewer financial barriers.

Results for Number of Hospital Days in Relation to Postulates

Postulate (a 1) that demographic variables would be more important in Sweden than in the United States receives support when we note the importance of age in Sweden in both Chart 7 and Table 52. Age is almost as important as the health level for predicting the number of days people will stay in the hospital.

The social structure variables are not generally more important in the United States as we would expect from postulate (b 1). In fact, our results indicate that while race was important in the United States, family size and social class may actually be more important in Sweden. Further, postulate (b 2) that the farm/non-farm variable would be more important in Sweden is not supported according to Table 52. Family resources were expected to be more important in the United States (postulate c 1). According to the gross B^2's in Table 52, income is important in Sweden as well as in the United States. However, the income variable was used in the U.S. AID analysis only. It should be remembered that the postulate was originally constructed on the assumption that more resources would lead to greater use. In fact, number of hospital days was found to be inversely associated with amount of family resources. In this respect postulate (c 1) is not supported.

Our expectation that region would be more important in the United States (postulate d 1) receives some support in that the regional variable was used in the U.S. AID analysis but not in Sweden. The AID analysis provides no support for the other community postulate (d 2) that residence would be more important in Sweden.

We have found in almost every comparative analysis to this point that perceived health does seem to be a better predictor in Sweden than in the United States. This is true also for number of hospital days, adding further support to postulate (e 1).

CHAPTER XI

THE RELATIVE IMPORTANCE OF PREDICTORS OF OTHER HEALTH SERVICES UTILIZATION

This chapter will consider determinants of who uses prescribed drugs and who will see a dentist. In both of these instances the analysis is limited to persons 21 years of age and over.

USE OF PRESCRIBED DRUGS

Chart 8 and Table 53 show the overwhelming importance of the health variables in both countries. Compared to the analyses for physician and

TABLE 53

RELATIVE IMPORTANCE OF VARIABLES PREDICTING USE OF PRESCRIBED DRUGS BY PERSONS 21 AND OVER[a]

PREDICTOR	IMPORTANCE, NOT CONSIDERING OTHER VARIABLES		IMPORTANCE IN MULTIVARIATE ANALYSIS	
	Sweden n=1776	U.S. n=4454	Sweden n=1776	U.S. n=4454
Demographic				
(s a 1) Age	.010	.004		
(s a 1) Sex	.028	.019		
(s a 1) Marital status	.013	.005		
Social structure				
(u b 1) Family size	.003	.003		
(u b 1) Education	.000	.001		
(u b 1) Social class	.003	.009		
(s b 2) Farm/Non-farm				
(u b 1) Race	—	.008		
Family resources				
(u c 1) Income	.005	.001		
(u c 1) Health insurance	—	.012		.007
Community resources				
(u d 1) Region	.001	.001		
(s d 2) Residence	.004	.001		
Perceived illness				
(s e 1) Symptoms	.096	.085	.034	.092
(s e 1) Level of health	.120	.047	.120	.015
Total			.154	.114

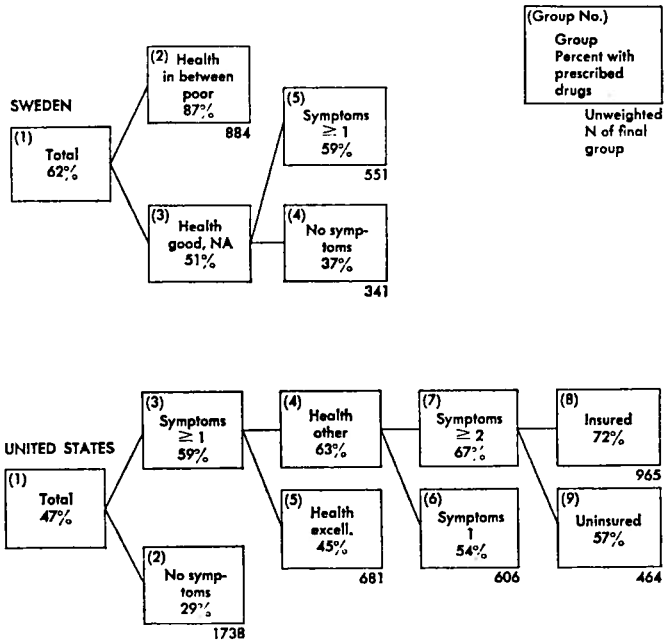
[a] For definitions of terms and symbols, see Table 46, p. 91.

hospital use, symptoms play a more important part compared to health level in the drug analyses. Number of symptoms reported is actually a considerably better predictor of who uses prescribed drugs than is health level in the United States.

The predictor trees in Chart 8 are basically quite similar in the two countries—except that level of health accounts for the initial split in

CHART 8

PREDICTOR TREES FOR ANALYSIS OF USE OF PRESCRIBED DRUGS BY PERSONS 21 AND OVER



Sweden while the symptoms variable accounts for the first split in the United States. Thus, in Sweden we find that 87 percent of people not in good health used prescribed drugs at some time during the survey year. At the other extreme, of the people in good health and with no symptoms only 37 percent used prescribed drugs (groups 2 and 4). Similarly, in the United States 67 percent of people with two or more symptoms and not in excellent health used prescribed drugs compared to only 29 percent of those individuals with no symptoms (groups 7 and 2).

The major difference between the predictor trees for Sweden and the

United States is the use of the insurance variable in the latter country. For the sickest people in the United States (group 7) the presence or absence of health insurance has an important effect on whether or not they use prescribed drugs. Seventy-two percent of the insured used drugs compared to 57 percent of the uninsured. This is important from a policy standpoint because it suggests that people who need drugs the most may be deterred from getting them if they are uninsured for hospitalization.

It should be remembered that at the time our data were collected there was practically no insurance coverage of drug costs in the United States. Why then the apparent effect of coverage on drugs in this country? One possibility is that insured people, having more of their other medical costs paid for, are better able to pay for drugs on their own. Another possibility is that the kind of people who would use prescribed drugs regardless of their medical care financing are also the kind of people who have health insurance.

Results for Use of Prescribed Drugs in Relation to Postulates

None of the demographic and social structure variables are used in the AID analysis of either country. Thus, no support is provided for postulates (a 1) and (b 1). However the gross B^2's for the demographic variables are larger in Sweden as would be expected from postulate (a 1). Further, the gross B^2's are relatively large for both social class and race in the United States in accordance with postulate (b 1). In these instances our unpublished data sources for the United States show that the higher social classes and the white population are more likely to use prescribed drugs than are the lower social classes and non-white population. No support is found for postulate (b 2) that the farm/non-farm distinction would be more important in Sweden.

Postulate (c 1) is supported in that health insurance, a family resource variable, has considerable importance in the United States. Community resources do not appear important for determining drug use in either country (postulates d 1 and d 2).

Perceived health is very important in both countries. It is difficult to say that it is more important in Sweden as suggested by postulate (e 1). Rather, the differentiation between the two countries is that level of health is the best predictor in Sweden while number of symptoms is the best predictor in the United States.

USE OF DENTAL SERVICES

An overview of Table 54 and Chart 9 reveals a quite distinct difference in the relative importance of predictors in the two countries. In Sweden

age is the most important criterion for determining who sees a dentist. In the United States the most important predictor is education. Thus Table 54 shows that age accounts for well over half of the explained variance in Sweden and Chart 9 reveals that in the AID analysis four of the age categories are eventually used. Likewise, Table 54 shows that

TABLE 54

RELATIVE IMPORTANCE OF VARIABLES PREDICTING DENTAL CARE AMONG PERSONS 21 AND OVER[a]

PREDICTOR	IMPORTANCE, NOT CONSIDERING OTHER VARIABLES		IMPORTANCE IN MULTIVARIATE ANALYSIS	
	Sweden n=1776	U.S. n=4454	Sweden n=1776	U.S. n=4454
Demographic				
(— a 2) Age	.086	.031	.109	.008
(— a 2) Sex	.003	.002	.013	
(— a 2) Marital status	.013	.010		
Social structure				
(u b 1) Family size	.011	.006		
(u b 1) Education	.067	.078	.030	.078
(u b 1) Social class	.047	.039	.015	
(s b 2) Farm/Non-farm				
(u b 1) Race	—	.013		
Family resources				
(— c 2) Income	.027	.047		.016
(— c 2) Health insurance	—	.030		.007
Community resources				
(u d 1) Region	.012	.005		
(u d 2) Residence	.020	.007		
Perceived illness				
(— e 2) Symptoms	.011	.001		
(— e 2) Level of health	.018	.007		
Total			.167	.109

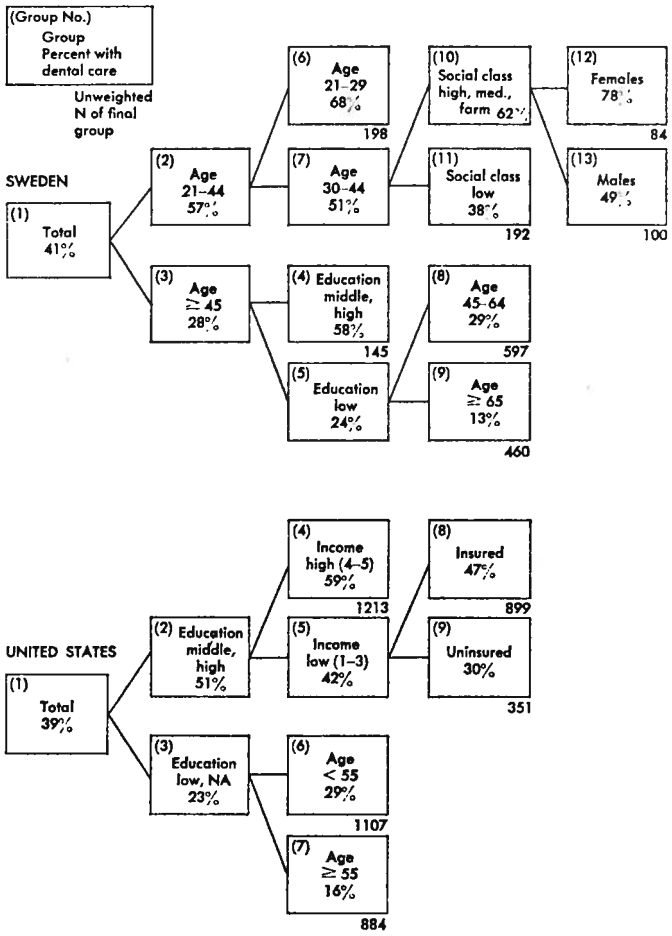
[a] For definitions of terms and symbols, see Table 46, p. 91.

education accounts for well over half of the explained variance in the U.S. tree.

While demographic variables are most important in Sweden and social structure variables are most important in the United States, it should be noted that similar variables are eventually used in the predictor trees for the two countries. In Sweden, for example, we find that among persons 30–44 those of low social class are less likely to see a dentist than

CHART 9

PREDICTOR TREES FOR ANALYSIS OF DENTAL CARE AMONG PERSONS 21 AND OVER



are other social classes (groups 10 and 11). Further, for persons 45 and over, those with low education are less likely to see a dentist than those with higher educational attainment (groups 4 and 5). Conversely, in the United States for persons with little education, people under 55 are more likely to see a dentist than those 55 and over (groups 6 and 7).

Results for Use of Dental Services in Relation to Postulates

The postulates about dental care are somewhat different from those for other services because the cost of dental services is generally not reimbursed under either system for adults. In addition, the special nature of dental care caused some change in the postulates. We had no expectations that demographic variables would be more important in one system than in the other (postulate a 2). In fact, Table 54 and Chart 9 suggest that age is a stronger predictor in Sweden than in the United States. We had further postulated that most social structure variables would be more important in the United States (postulate b 1), and the importance of education in the United States supports this idea. However, postulate (b 2) about a greater effect of the farm/non-farm distinction in Sweden is not supported. Dental care was the one service where we did *not* expect family resources to be more important in the United States (postulate c 2). However, our findings show that income does appear to be more important in the United States. Also Chart 9 shows that persons with relatively high education but low income are more likely to see a dentist if they have insurance than if they are uninsured (groups 8 and 9). In this instance we suggest that insurance is probably substituting for a social structural variable since dental services are not insured. While none of the community variables were used in either country, the gross B^2's suggest that residence may be more important in Sweden than in the United States as postulated in (d 2) but not that region is more important in the United States as suggested in postulate (d 1). Finally, we postulated that perceived health would be relatively unimportant in determining dental use in both countries (postulate e 2). In support, level of health is not used in the AID analysis in either country. Further, the magnitude of the gross B^2's in both countries is much lower than for any of the other services analyzed.

CHAPTER XII

SUMMARY OF RESULTS REGARDING DISTRIBUTIONAL POSTULATES

In Chapters V through XI we have examined evidence bearing on our postulates about differences in the distribution of health services between Sweden and the United States from various statistical perspectives. We started with age-adjusted cross-tabulations (Chapters V–VII), moved on to a form of partial correlation (Chapter VIII), and concluded with the AID analyses (Chapters IX–XI). This progression allowed us to first examine basic descriptive relationships and subsequently to consider more complex multivariate relationships. However, the use of different techniques leaves us with the task of drawing together our findings from each technique and making some summary conclusion about how they bear on each of our postulates.

As stated in the introduction, the complexity of the problem and the relative lack of sophistication of research techniques at this time preclude us from saying that our postulates are "proven" or "disproven". Nevertheless, we do feel our evidence is such that we can talk about "greater" or "less" degree of support for them.

Table 55 provides a summary of our conclusions regarding each postulate. For each kind of service and each independent variable relevant to a given postulate we examined the crosstabulations, the AID analysis, and—where appropriate—the partial correlation analysis. A postulate is labeled "supported" in Table 55 only if support is found in *all* relevant analyses. Thus, if for a certain predictor significant differences in the expected direction are found in the cross-tabulations but the predictor does not account for any variance in the AID analysis, the variable would *not* be listed as supporting the postulate in Table 55. Thus, some postulates will not be labeled as supported even though some fairly convincing evidence on their behalf is at hand. However, we decided in favor of listing as "supported" in the summary table only those postulates with the most conclusive substantiation.

In some cases Table 55 also lists a postulate as "not supported". This occurs when the cross-tabulations and the AID analyses show findings which are definitely against our hypotheses—for example, the results for age and sex in the analysis of hospital days. No comments are found in

TABLE 55

FINDINGS CONCERNING POSTULATES[a] ABOUT THE RELATIVE EFFECT OF PREDICTORS OF MEDICAL CARE UTILIZATION

TYPE OF UTILIZATION	TYPE OF PREDICTOR				
	Predisposing		Enabling		Perceived Illness
	Demographic	Social Structure	Family	Community	
Physician					
Physician care	(a 1) Supported for age	(b 1) Supported for social class and race	(c 1) Supported	(d 1) Supported for region	(e 1) Supported
Number of visits	(a 1) Not supported for age and sex			(d 2) Supported for residence	(e 1) Supported
Hospital					
Hospital care			(c 1) Supported for insurance		(e 1) Supported
Number of days	(a 1) Supported for age	(b 1) Supported for race		(d 1) Supported for region	(e 1) Supported
Prescribed drugs					(e 1) Supported
Dental care	(a 2) Not supported for age	(b 1) Supported for education	(c 2) Not supported		(e 2) Supported

[a] See Table 14 for a summary of postulates indicating country in which variable was postulated to be important. The letter and number in parenthese refer to the postulate designation found in Table 13.

the table when postulates are not "supported" according to our definition of the term nor is there evidence that the relationships are in the opposite direction of those stated in the postulates.

The various analyses have shown rather consistently that the reasons persons gain access to the system (hospital and physician care) are often not the same reasons that determine the volume of services they receive following initial contact. Consequently, access to and volume of services are considered separately for both doctors and hospitals.

While the analyses do not generate support for all of the postulates, some of the most important postulated differences between Sweden and the United States are verified. Further, we feel that the behavioral model as a whole has proved to be a helpful device for comparing how health service systems are used by people in different countries. It is our hope that these findings will provide some background for the more sophisticated model building and detailed hypothesis testing which we expect to follow in international comparisons of health service delivery systems.

While much of the work to be done is beyond the scope of this project, one final analysis is indicated. This is an attempt to separate system effects from other kinds of effects that result in differential health service utilization from country to country. We turn to this topic in Chapter XIII.

CHAPTER XIII

COMPARISONS OF THE EFFECTS OF THE MEDICAL CARE SYSTEMS ON UTILIZATION OF HEALTH SERVICES

In Chapter III we saw considerable evidence of system differences between Sweden and the United States. In Chapters V through XI we saw that individual, family, and community characteristics have differential impact on the use of health services by persons in the two countries. A subsequent question which might be asked is, are there really system differences apart from differences which can be explained by other characteristics of individuals? For instance, more persons in Sweden than in the United States use prescribed drugs. There is also some class difference in the use of drugs in the United States but *not* in Sweden. The systems seem to work differently according to the class of the individual. The question then becomes, can the apparent system difference be explained by class? Or if we eliminate differences of this kind in both countries, would there still be a difference in the overall use of drugs?

The purpose of this chapter is to attempt to look for system differences after we have taken into account as best we can individual, family, and community differences.

The analysis made with this aim involves first pooling the observations from each country. To make the samples as comparable as possible we have eliminated uninsured and non-white people in the United States from the analysis. As we have seen, these characteristics account for considerable difference in the use of health services in the United States. Since there are no comparable differences in Sweden and we are interested in holding constant effects other than those of the system *per se,* it seemed best to remove them from the analysis.

Because the weighted sample in Sweden is larger than the unweighted sample in the United States, uniform weights were assigned to all cases in the United States sample so that the sum of the weighted observations was approximately equal in the two countries. The rationale was that potential system effects in each country would be more readily apparent using this weighting system.

The pooled observations were then divided into those under age 21 and those 21 and over. This was done because not all of the predictors were available for young persons in the analysis. Further, there was some evi-

dence that the system worked differently for young people and older people in the two countries.

For each group a two-stage AID analysis was used. In the first stage all predictors except country were included. The purpose was to eliminate as much as possible variance accounted for by variables other than the country in which the individual lived. In the second stage, the dependent variable was the residual of the dependent variable in the first stage and country was used as the predictor.[1]

PHYSICIAN UTILIZATION

Table 56 shows that the estimated portion of persons seeing a doctor in the two countries is similar after adjusting for other differences. For neither age group was country able to account for a significant portion of the variance in seeing a doctor. This finding then supports our conclusion in Chapter III that the different systems of delivering medical care in Sweden and the United States had quite similar results for the populations in terms of the proportion of the population that would see a doctor within a year.

TABLE 56

ESTIMATED PHYSICIAN UTILIZATION ADJUSTED FOR INDIVIDUAL, FAMILY, AND COMMUNITY DIFFERENCES

MEASURE OF PHYSICIAN UTILIZATION	ADJUSTED ESTIMATE[a]		DIFFERENCE OF ESTIMATES[b]
	Sweden	U.S.	
Percent seeing a physician			
Persons 21 and over....	70.7	68.0	+2.7
Persons under 21.....	72.7	69.0	+3.7
Mean number of visits for persons seeing a physician			
Persons 21 and over...	5.3	7.6	—2.3*
Persons under 21.....	3.4	4.8	—1.4*

[a] Adjusted estimate calculated as mean for pooled sample plus or minus mean estimate for each country in residual analysis.

[b] An asterisk (*) indicates that division by country explained .01 or more of residual variance (see Appendix C). + indicates higher utilization in Sweden. — indicates higher utilization in the United States.

System differences in average number of physician visits shown in Chapter III remain even after adjusting for individual, family, and community differences according to Table 56. These system differences hold for both older and younger persons. Thus we see that the adjusted average number of visits in the United States for persons 21 and over was 7.6 compared to 5.3 in Sweden. For persons under 21 those in the United States averaged 1.4 visits more than young persons in Sweden. These results then suggest that people with similar individual characteristics will see a doctor more if they live in the United States than if they live in Sweden. Further, we suggest that this difference may be largely attributed to the different ways medical care is organized in the two countries.

[1] A detailed description of this process is found in Appendix C.

HOSPITAL UTILIZATION

In Table 57 we find that while the adjusted estimate of the proportion of persons who entered a hospital during the survey year was slightly higher in Sweden than in the United States, particularly for younger persons, in no case was the difference sufficient to account for one per cent of the residual variance. This finding again supports our earlier conclusion that system differences with respect to the proportion of persons who enter the hospital were relatively minor between Sweden and the United States.

TABLE 57

ESTIMATED HOSPITAL UTILIZATION ADJUSTED FOR INDIVIDUAL, FAMILY, AND COMMUNITY DIFFERENCES[a]

MEASURE OF HOSPITAL UTILIZATION	ADJUSTED ESTIMATE		DIFFERENCE OF ESTIMATES
	Sweden	U.S.	
Percent admitted to a hospital			
Persons 21 and over...	11.1	10.8	+0.3
Persons under 21.....	7.7	6.9	+0.9
Mean number of hospital days for hospitalized persons[b].....	22.3	15.0	+7.3*

[a] For definition of terms and symbols, see Table 56, p. 124.

[b] For persons 21 and over only.

In contrast, the adjusted estimate of number of days spent in the hospital was considerably higher in Sweden than in the United States. Adjusted for other factors that might influence length of stay, Swedish adult inpatients are estimated to spend on average 7.3 days more in the hospital during the year than are Americans who are hospitalized. These

results add additional support to the conclusion that differences in length of stay point to important system differences between the two countries.

OTHER HEALTH SERVICES

Table 58 presents estimates of the proportion of persons using prescribed drugs and seeing a dentist in each country adjusting for individual differences. Even after taking into account other factors which affect prescribed drug use, the proportion of Swedes using prescribed drugs is still estimated to be almost ten percent higher than the proportion of Americans using drugs. Again, this is evidence of an important system difference.

TABLE 58

ESTIMATED UTILIZATION OF PRESCRIBED DRUGS AND DENTAL CARE ADJUSTED FOR INDIVIDUAL, FAMILY, AND COMMUNITY DIFFERENCES[a]

MEASURE OF UTILIZATION	ADJUSTED ESTIMATES		DIFFERENCE OF ESTIMATES
	Sweden	U.S.	
Percent using prescribed drugs[b]	61.6	52.1	+9.5*
Percent seeing a dentist[b]	46.0	40.3	+5.7

[a] For definition of terms and symbols, see Table 56, p. 124.
[b] For persons 21 and over only.

Table 58 also suggests that people in Sweden are more likely to see a dentist. While the adjusted difference is somewhat greater than the unadjusted difference (see Chapter III, p. 24), the adjusted difference is still not sufficient to account for 1 percent of the residual variance in the AID analysis which is our rough measure of significance.

In sum, the analyses in this chapter suggest that overall differences in use found earlier with respect to number of physician visits, number of hospital days, and prescribed drugs cannot be accounted for completely by different individual characteristics of persons in the two countries. This adds additional support to the proposition that systems effects on the utilization of health services in Sweden and the United States do exist, and, for these services at least, are quite important.

CHAPTER XIV

IMPLICATIONS

In the introduction we stated that our purpose was not to evaluate the total system in Sweden and the United States nor to conclude that one system was "better" than the other. Rather, our goal was to document the differences in use of services and to begin to consider reasons for the differences that exist. However, we do feel that findings from studies such as this one can have public policy implications for both countries studied stemming from the differences uncovered and our understanding of the overall policy objectives currently being sought in each country.

In this chapter we will attempt to provide some framework for relating the empirical results of comparative studies to some underlying value judgments about how medical care should be provided in each country. Given the problems of defining what "ideal" use should be in any country, this approach uses as a starting point actual use patterns in another country to provide at least some criteria of judgment. Further, we shall give examples of how particular empirical findings bear on policy implications.

The step from research findings to policy implications is beset with difficulties. Some readers will no doubt disagree with our interpretation of the empirical results. More importantly, there will be disagreement about the underlying values we are trying to implement. Even if the values are accepted, there will not be consensus regarding the means of bringing them about.

There can be little disagreement, however, that medical care systems are in a state of flux based on advancing medical technology, rapidly increasing expenditures and changing perceptions of consumers and providers. This dynamic state then suggests that change will continue to take place regardless of the extent to which information is used to influence the nature of the change. We will assume that, to whatever extent public policy influences the change, the infusion of factual knowledge into this process will have a positive influence, or at least not a negative one.

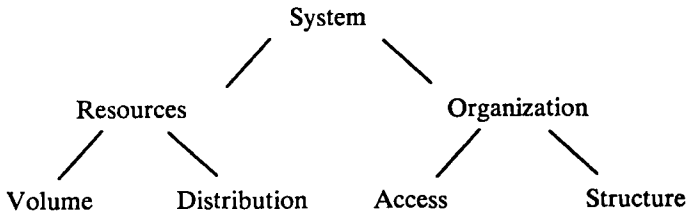
Consequently, while there may be disagreement with many of the specifics of the following sections, we hope that the general approach will be judged on its own merits. This approach is no more than a modest effort to apply the results of large scale comparative studies of medical

care utilization to current thinking about distributing health services in the countries studied.

In keeping with the general outline of the report, this chapter will have two sections. The first will deal with overall system differences. The second section will consider the criteria by which health services are distributed in the two countries.

SYSTEM DIFFERENCES

In order to consider system differences between Sweden and the United States, the following framework has been employed:



We will deal with each of these sections separately.

Volume of Resources

With respect to volume of resources, we have characterized the Swedish system as "hospital intensive" because it has a higher hospital bed-population ratio and the U.S. system as "physician intensive" because it has a higher physician-population ratio. This difference is also reflected by the patterns of use. While this study has not provided definitive proof of the relationships, it is reasonable to assume that these differences in volume of resources are associated with more hospital days per person in Sweden and more physician out-patient visits per person in the United States.

One basic goal developing in both Sweden and the United States—though attainment has been, so far, less than spectacular in both countries—is to shift inpatient care to outpatient care whenever possible. This goal is sometimes justified on the basis that it will provide more effective treatment to the patient. A more important motivation seems to be the belief that maximizing outpatient services in a system will help to minimize the total costs of providing care to the population because of the high magnitude of current costs for insitutionalized care. Cost reduction, or, at least, cost containment, is an overriding notion in both countries despite all attempts to rationalize that such a shift is "better."

Our comparative findings then suggest that one approach Sweden might pursue in an effort to make its system more outpatient-oriented is to increase the number of physicians relative to its inpatient facilities. In fact, the Swedish government has embarked on such a policy since our study was conducted and apparently for the long-range objective of de-emphasizing institutional care. It would not seem, however, that the contemplated increase of physicians by 50 percent in ten years or so can feasibly result in an overall relative reduction of gross cost unless hospitals are actually shut down or beds reduced as length of stay decreases.

Another trend concerning the organization of care in Western countries has been to examine the activities of the physician with the idea of transferring certain of his tasks to ancillary personnel. One stimulus for such a trend is that more adequate outpatient care can be provided by supplementing physicians. However, cost again seems to be a main determinant. Substituting the less expensive services of ancillary personnel for the more expensive time of the physician is expected to reduce the unit costs of providing patient care although it may actually increase the gross cost through increased volume of all kinds of services used.

In Sweden, we do in fact find that a considerable number of outpatient visits are to public health nurses. Taking these into account brings the mean number of outpatient visits in Sweden closer to the mean in the United States. This suggests that use of more ancillary personnel in providing outpatient services is a viable alternative to current practice in the United States.

Distribution of Resources

This component is defined primarily in terms of the geographical location of the personnel and institutions providing medical care in relation to the population of the geographical area. We have relatively little data bearing on the relationship of distribution and utilization. Our findings do indicate, however, that there are relatively fewer physicians in the rural areas of Sweden. Further, differences in use of physicians between urban and rural areas appeared to be generally greater in Sweden than in the United States. These data then suggest that one reason for the greater differences in Sweden might be related to lack of physicians in rural areas. Such differences might then be reduced by increasing the number of physicians practicing in these areas.

Organization Access

We have judged the accessibility of the population to the Swedish system to be greater than to the system in the United States because the

proportion of the cost of services paid by the consumer at time of service is lower in Sweden. However, if judged by the proportion of persons who use hospital and physician services during the survey year, accessibility is quite similiar in Sweden and the United States. This does not necessarily mean that the same kinds of people are getting care in the two systems. In fact, we know that the criteria by which services are distributed in the two systems are considerably different. As we will see in the next section, the relevant criteria in Sweden are more coincident with the criteria which would be appropriate under a system of "equitable distribution" than are the criteria used in the United States. Increasing accessibility by reducing what the consumer must pay in the United States would, in our estimation, make the criteria more like those in Sweden.

Drugs are also financed by a third party to a greater extent in Sweden than in the United States. Under the Swedish system more people use prescribed drugs. It is most likely that utilization in the United States would increase under a similar system. The efficacy of an overall increase in the use of prescribed drugs is apparently not above question. There is some discussion in Sweden about over-utilization of these drugs and "stockpiling" of drugs by certain individuals. Certainly, it is debatable whether it is altogether positive that proportionately more persons in the best health category in Sweden use prescribed drugs than in the United States. Of course, a fundamental question is whether the sickest people most in need of prescribed drugs are getting them. The evidence is that such persons are more likely to use drugs in Sweden than in the United States.

Organization Structure

In Chapter II we have already discussed the complexity of the organizational structure component of the health service system. Here we will consider only a few of the many possible topics which might be taken up. One point already considered under volume of resources is use of ancillary personnel. We have found that Sweden makes greater use of such personnel—at least in terms of public health nurses. Midwives also provide considerable obstetrical care both on an inpatient and outpatient basis although all deliveries take place in the hospital. While it is beyond the scope of this present study, it would be interesting to compare the structures of the two systems to see how patient care responsibilities are delegated to such personnel in Sweden but not in the United States.

It is sometimes suggested that the shorter length of stay in the United States is the result of the greater financial burden the patient must bear,

compared with Sweden. Because of mounting costs, it is argued that the patient is economically motivated to leave the hospital as soon as possible. This argument, however, is somewhat at odds with the fact that the uninsured tend to stay longer than the insured once they get into the hospital.[1] More importantly, it is generally found that persons with the most comprehensive hospitalization insurance coverage in the United States continue to have lengths of stay considerably shorter than those for Sweden. In fact, the United States patients with the medical care financing most similar to that of Sweden—group practice prepayment—tend to have lengths of stay shorter than those for the U.S. population as a whole.[2] Thus we must conclude that differential financing of hospital services is not the total explanation for the longer lengths of stay in Sweden.

From a structural viewpoint we feel two points should be mentioned as possible determinants of Sweden's longer length of stay. One consideration is the higher personnel-patient ratio in the United States. While there is continuing debate about the extent to which higher personnel ratios might reduce lengths of stay, the possibility should not be dismissed without more definitive evidence than we have at this point. Of course, from a policy standpoint, questions of quality and cost per patient day and per episode of illness cannot be divorced from these considerations.

The second issue concerns the shift in patient responsibility in Sweden when the patient is admitted to the hospital. We feel this study has produced some evidence that the Swedish structure does result in more inpatient care and less outpatient care when compared with the United States. To the extent this is true, a simple increase in the number of physicians in Sweden or reimbursement schemes which make outpatient care as financially appealing as inpatient care will not necessarily reduce length of stay. The basic conclusion, which certainly needs verification, is that a system under which the doctor responsible for a person's outpatient care is not the same as the doctor responsible for his inpatient care should expect longer lengths of stay than a system under which the same doctor is responsible for both types of care. A structural change in terms of responsibility for the patient would be necessary to reduce length of stay differences attributable to this cause.

DISTRIBUTIONAL DIFFERENCES

In this section we will assume that a basic policy of the health service

[1] In 1963 it was 8.8 days for the uninsured compared with 7.0 days for the insured. Andersen and Anderson (1967), p. 131.

[2] Health Insurance Plan of Greater New York (1965), p. 9, Table 10, and Perrott and Chase (1968).

systems in both Sweden and the United States is to provide an "equitable" distribution of health services. We will attempt to define equitable distribution with the help of the behavioral model of health service use described in Chapter IV.[3] Equitable distribution does not mean that all individuals should receive the same amount of health services regardless of their other characteristics. Rather, the effects of certain components of the model on use of services would be maximized and others would be minimized under a system of equitable distribution. Table 59 shows which components of the model would have maximum effect and which should have minimum influence under a system of equitable distribution. Under this definition the influence of demographic and illness characteristics would be maximized. The influence of social structure and enabling characteristics would be minimized.

TABLE 59

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

Component	Subcomponent	Effect
Predisposing.....	Demographic	Maximized
	Social structure	Minimized
Enabling.....	Family resources	Minimized
	Community resources	Minimized
Illness.....	Perceived illness	Maximized

Demographic variables are important bases for distributing health services under a system of equitable distribution because of the well established relationships of age, sex, and marital status to physical need, disease patterns, health maintenance, and subsequently use of health services. The influence of social structure is minimized because it is independent of need. Allocation on the basis of education, social class, or race suggests that underlying attitudes and knowledge, life style, or differential treatment are important determinants of medical care.

The effects of family resources such as income and health insurance would also be minimized. Lack of these resources represents barriers to medical care. Barriers to use cause differences which a policy designed to spread health services seeks to remove. Community resources also differentiate individuals for reasons which are not compatible with the concept of equitable distribution. For example, the rural person may

[3] This approach is adapted from Andersen (1968, pp. 58–64).

use fewer services than his urban counterpart because of hardship or inconvenience in getting to a doctor.

Variation explained by illness is maximized. In fact, the concept of equitable distribution is based on the assumption that illness as defined by the patient and his family or the system should be the primary determinant of how services are distributed.

The above discussion has suggested which effects in the behavioral model of health service use would be maximized and which would be minimized in a system which provides equitable distribution of services. We will now compare actual sources of variation in Sweden and the United States with the system of equitable distribution.

With respect to seeing a physician, number of hospital days, and use of dental care, the demographic criteria for distribution in Sweden generally correspond more closely to the ideal type than they do in the United States. That is, there is greater differentiation according to age in Sweden. Such is not the case for use of prescribed drugs and admissions to the hospital.

Generally, the aged population gets a greater proportion of services provided in the United States than in Sweden.[4] In contrast, children and young adults tend to get proportionately fewer services in the United States. This is particularly true for children from families of lower income and lower class. Medicare has strengthened the trend toward proportionately more care being provided to the U.S. aged population. These findings suggest that a target population for further redistribution of health services in the United States should be the younger population, particularly those in lower income families.

Social structural effects, which should be minimized in a system of equitable distribution, were generally stronger in the United States than in Sweden. However, even in Sweden with a more homogenous population and a generally more accessible health services system, some class differences were found in use of services. These findings suggest that providing people with means to attain services or restructuring the system does not alway result in equitable distribution. Alternatives include further experimentation with methods of delivery or attempts to alter the behavior of certain groups within a country. With respect to the latter alternative, there is little evidence to date that suggests short term health education campaigns can substantially alter the long run behavior of classes. The general educational process on the other hand seems to have a definite impact on health and illness behavior. The major problem

[4] The major exception to this generalization is number of hospital days for persons admitted to the hospital.

here, of course, is the length of time necessary to bring about change.

It should also be noted that in both countries people lower in the social structure sometimes use more services than those higher in the class system. This occurs for number of days in the hospital in both countries and in certain other cases for Sweden as well. While we have no conclusive reason for these results, we suggest that they may indicate greater need for services by these classes as perceived either by the patient or by the practitioners treating him. Certainly, in the short run this suggests that equitable distribution might mean that lower class persons should actually be using more of certain kinds of services than the rest of the population until illness patterns are equalized.

One component of social structure which was an important determinant of medical care distribution in both countries, particularly for children, was family size. Generally, we found that the larger the family, the fewer the services the individual receives. This result is certainly not compatible with the concept of equitable distribution of services. It suggests a systematic bias against persons in large families. If such is the case, future health service planning should specifically take into account the special needs of persons in large families. At least more systematic study of this phenomenon and its implications for the health of persons according to the size of the family in which they reside should be undertaken in both Sweden and the United States.

Enabling family resources have been shown to be much more important in determining the distribution of health services in the United States than in Sweden. Thus, while class differences were noted in some cases in Sweden, income differences tended to be negligible. In the United States both kinds of differences were noted. The income and insurance differences in the United States suggest that simply making the system more accessible (reducing the proportion of total consumer expenditures paid for directly by the consumer) can play an important role in providing more equitable distribution of services. It will probably not always be necessary to change the way in which services are delivered to bring about such changes. It can be argued that reducing or eliminating direct consumer charges is the primary step to equalizing accessibility. Organizational and other changes can be implemented thereafter.

Community resources represented by geographical area and urban nature of a person's residence played a relatively minor role in distributing health services in both countries. This is what would be hoped for under a system of equitable distribution. There was some indication of greater urban-rural differences in Sweden. In some respects these differences appear similar to those in the United States in the 1930's and 1940's.

If, then, we use urban patterns as closer to the desired result, medical care patterns in rural areas of Sweden might be more closely scrutinized with the idea of possible modification.

A central finding of the study was that how people perceived their general health was more closely related to the kinds and amounts of medical care they used in Sweden than in the United States. Since this is the proposed goal of a system of equitable distribution, it suggests the value of close examination of the Swedish system by researchers, policy makers and health care administrators in the United States. While the system of one country could probably never be totally adopted by another due to historical, cultural, and economic differences, certainly there are elements of a given system which with proper experimentation and adaptation might be fruitfully transferred from one system to the other to provide more equitable distribution of health services.

APPENDIX A

SURVEY METHODOLOGY

The Swedish social survey providing data for this comparative study was part of a study on health and use of health services during the year 1963. Data were collected from different record sources regarding characteristics of the population under study and its use of health services. The main source of record data was the National Health Insurance, the registers of which constituted the frame from which a nationwide sample was drawn. A subsample of the population studied was then interviewed in early 1964 about health experiences in 1963. The comparative part of the study is restricted to the subsample subject to interviewing, but the data used are derived both from records and interviews.[1]

The United States data for this study are drawn from a nationwide social survey conducted in early 1964. In addition to its use for this international comparison, the survey was designed to parallel earlier studies. It 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).[2] The survey collected information through interviews about family health experiences during 1963. The interviews stressed types and amounts of health services used, cost of these services, and how families paid for them.[3]

Although the studies in the two countries were planned to meet different national interests, considerable effort was put into their planning and design to attain comparability and make the results suitable for valid international comparisons. This methodology appendix will summarize the research methods used in each country with respect to sample design and sampling execution, interviewing, and verification and estimation procedures. Special emphasis is given to questions of comparability between the two surveys. Description of variables used in this comparative study and details on analysis techniques employed will be given in subsequent appendices.

SAMPLE DESIGN AND SAMPLING EXECUTION

Sweden

All Swedish citizens resident in Sweden and 16 years of age and older, as well as all foreigners 16 and over registered in Sweden for census purposes, are covered by compulsory National Health Insurance and are registered with the public insurance funds. Children under 16 are also covered by the insurance scheme but are not registered. The first sampling stage included a

[1] A complete description of the research methods used in the Swedish study is given in a report to be published by Smedby (1970).

[2] In 1962 HIF became a part of the Center for Health Administration Studies of the University of Chicago.

[3] The final report for the 1964 study was published as Andersen and Anderson (1967) and includes the detailed methodology of the United States study.

systematic sample of this registered population. In principle a 1/365 sample was defined, including all persons registered with the public insurance funds at the beginning of 1963 who were born on February 15. Register data about this sample were collected in early 1963 and at the end of the year from the approximately 600 local offices of the public insurance funds. The sample was later compared with and expanded from central registers at the National Social Insurance Board and at the Central Bureau of Statistics. Through these procedures the February 15 sample was defined to include 16,561 persons. This sample proved to be representative of the total registered population.[4]

Record data on sickness causing disability and on use of health services of persons in the sample were collected continuously during 1963. Thus, copies of claims for loss-of-income because of sickness (including hospital in-patient care), claims for reimbursement of costs for doctor visits, and other health expenditures were received from the public insurance funds. Prescription forms for drugs were collected from all pharmacies in the country. Data on taxable income for persons in the sample and their spouses were collected from a central register at the Central Bureau of Statistics.

Thus, it was possible to take advantage of the record data already collected for a subsample of persons drawn for interviewing at the beginning of 1964. The sample was stratified according to age and disability and the subsample was chosen to include disproportionately large numbers of older persons, those with disablement pensions and those with 90 or more disability days during 1963 according to the records. The subsample was drawn as systematic periodic samples within the different strata. Weights were then assigned to persons in different strata to make the subsample representative of the total population 16 years of age and over at the beginning of 1963.

No corresponding sampling of individual children was performed. Instead, children were selected for the survey through the adults falling into the subsample described above. When an adult person was interviewed, information was also gathered about children of the respondent and his or her spouse. All children under the age of 16 living in the family were included, as were step-children and foster-children.

In order to make the children in the sample representative of the children in the country as a whole, a modification of the weighting procedure was applied. A child living in a complete family, including both the father and the mother of the child, had twice the probability of falling into the sample as had a child living in an incomplete family including only the mother or only the father. Furthermore, children of complete families had twice the probabilty of adults of being chosen, because they could be included either through the father or through the mother. Therefore, children from complete families were given a weight of half that of the index parent while children from incomplete families were given the same weight as the index parent. The stratified Swedish sampling plan and the weights used are shown in Table A-1.

The target population of the study was the non-institutionalized population of the country. It was therefore necessary to exclude persons in the original subsample—drawn from the registers—who had been institutionalized for the

[4] It is noted, however, that a sample of persons, all born on the same date, will have an average age which differs slightly from the average age of a sample constituted of people born in all months of the year.

TABLE A-1

THE SWEDISH STRATIFIED SAMPLING PLAN AND WEIGHTS USED

STRATUM DESCRIPTION	SAMPLING QUOTIENT	WEIGHT ASSIGNED TO		
		Respondent	Child in complete family	Child in single parent family
I. Persons aged 16–66 with a disablement pension at the beginning of 1963	1/2	4	2	4
II. Persons aged 67 and over	1/4	8	4	8
III. Persons aged 16–66 (without disablement pension) with at least 90 disability days during 1963[a]	1/1	2	1	2
IV. Persons aged 16–66 (without disablement pension) with less than 90 disability days during 1963[a]	1/12	24	12	24

[a] Number of disability days according to insurance records.

whole year of 1963. It was not always possible, however, to find out from the records that a person was institutionalized. Sometimes this was not discovered until an interview was tried. Therefore, the original subsample was later reduced to include only non-institutionalized persons. The size of this reduced sample is shown in Table A-2 which also gives the numbers of interviews actually performed in each stratum. In addition to the 1,933 adult respondents, information was gathered on 985 children under the age of 16 years.

TABLE A-2

SIZE OF SWEDISH SAMPLE BY STRATA AND NUMBER OF ADULT RESPONDENTS

Stratum[a]	No. of persons 16 and over originally drawn	Reduced, non-institutionalized subsample	No. of interviews performed	Percent interviewed[b]
I	170	128	102	80
II	560	552	467	85
III	513	503	416	83
IV	1038	1038	948	91
Total	2281	2221	1933	90[c]

[a] See Table A-1 for description of strata

[b] Percentages are based on the non-institutionalized subsample of adults (16 and over).

[c] Weighted overall response rate.

It can be seen from Table A-2 that the weighted overall response rate was 90 percent. The reasons for respondent losses are specified in Table A-3 which shows that the main reason for non-interviews was refusals. The reason for the category "dead at time for the planned interview" is that the registers from which the subsample to be interviewed was drawn were for persons living at the beginning of 1963, more than a year before the interviews were started.

TABLE A-3

REASONS FOR NON-INTERVIEW IN THE SWEDISH SURVEY

Reason for non-interview	Percent of all planned interviews[a]
Dead at time for interview	1
In hospital at time for interview	1
Refused to participate	4
Not at home after repeated calls or address unknown	2
Other (respondent too ill to be interviewed, temporarily abroad or in military service, language barrier, etc.)	2
Total non-interview rate	10

[a] Weighted percentage based on non-institutionalized subsample (unweighted n = 2221).

United States

The universe sampled in the study was the total non-institutionalized population of the continental United States. The sample was a standard multistage area probability sample developed by the National Opinion Research Center (NORC).

The primary sampling units (PSU's) were standard metropolitan areas and non-metropolitan counties. These units were stratified according to geographic region, size of largest town, median family income, economic characteristics, and, in the South, race. From each stratum one PSU was selected with probability proportionate to population.

Within each selected PSU, localities were stratified according to size and urban type and selected with probability proportionate to size. Within each locality a sample of ultimate clusters or segments was selected. An average of four dwelling units per segment was assigned for screening.

The number of segments to be selected from any given locality was predetermined by the establishment of the desired sampling ratio for the entire United States, the probability of the particular locality, and the desired cluster size. The actual procedure employed in selecting the necessary number of segments from a particular locality depended on whether or not a recent city

directory was available. The street address section of a city directory constituted the sampling frame for about 20 per cent of the localities. These were generally medium sized cities. When city directories were not available, 1960 census data were used. To select segments or blocks, a listing of households which constituted the final sampling frame was carried out by interviewers prior to the study.

This procedure resulted in 2,852 families being designated in the sample. Interviews were completed for 2,367 families, including 7,803 family members, corresponding to a completion rate of 83 percent. Table A-4 shows the results of the interviewing attempts for all sample families. Over three-quarters of the families not interviewed either refused to be interviewed, or initially agreed but subsequently broke off the interview, or failed to provide enough information to be included in the analysis. The remainder were families who could not be located at home after repeated visits and families who, while located, were not interviewed for some other reason such as language problems or long-term serious illness of respondent.

TABLE A-4

REASONS FOR NON-INTERVIEW IN THE U.S. SURVEY

Reason for non-interview	Percent of all sample families (n=2852)
Refused to participate	12
Broke off	1
Not at home after repeated calls	2
Other (language problem, respondent too ill to be interviewed, etc.)	2
Total non-interview rate	17

Adjustments of the Samples for Comparative Purposes

Different kinds of samples were used for the two surveys which provided the results compared in this study. In Sweden the sampling unit was an adult individual with information gathered also on children of this person. In the United States the sampling unit was a dwelling with information gathered on every individual in the dwelling. The Swedish sample has to be weighted to represent the total population. No weighting is necessary for the U.S. sample since all individuals had an equal probability of being included in the sample.

Both types of sample design aimed at a representative sample of the non-institutionalized population of the country. However, certain differences exist between the two original studies. These differences and our attempts to cope with them are discussed below.

The Swedish non-institutionalized sample included persons living in old-age homes. Persons living in similar accomodations in the United States were excluded from the original sample. Therefore, 22 respondents in Sweden living in old-age homes have been excluded from this comparative analysis. The final Swedish sample thus includes 1,911 persons 16 years and over and 895 children under 16 for a total of 2,806 persons.

There are also differences as regards population coverage. In order to derive correct estimates pertaining to a period as long as a year from a single wave survey, it is necessary to compensate for the absence on the interview date of individuals who had been members of the population at some time during the year but had left it. This is of special importance for studies of medical care use because of high utilization by individuals who die during the survey year.

In the original U.S. survey an attempt was made to include in the survey at least those decedents who had, at some time during the survey year, lived with a relative who was still a population member at the end of the year. In a case like this information was gathered through the relative. By this method it seemed that about 70 percent of all survey-year decedents were represented in the sample. Decedents who had been living alone or only with individuals who had also left the population were necessarily excluded.

In the Swedish survey interview data were collected only from the respondent himself except for children. Thus, no interview data were gathered for persons who died during the survey year. In the original Swedish study this has been compensated for through a special record study, mainly based on health insurance data, including the decedents. However, the record data cannot easily substitute for all kinds of interview data used in this comparative study.

In order to eliminate the difficulties with no interview data on Swedish decedents and only part coverage of U.S. decedents, we have excluded 54 persons from the original U.S. sample who had lived in a household included in the sample during 1963 but who died before the interview date. This exclusion will result in estimates on use which are somewhat too low for the populations as a whole but will make our comparisons more valid.

The U.S. sample includes 7,749 persons after excluding those who died. Since many of the cross-tabulations presented in this report are age-adjusted, we have also excluded 38 cases with no information on age from these tables as well as from the multivariate analyses where age was used as an explanatory variable. The U.S. sample includes 7,711 persons in these instances.

INTERVIEWING

Sweden

The interviews were mainly conducted by public health nurses as part of their regular work. These nurses are spread all over the country, and they usually have a thorough knowledge about the population of their districts. In the large cities, where no public health nurses are available, other nurses experienced in home visiting were employed for interviewing.

A questionnaire with the name and address of the person to be interviewed was mailed to the nurse in the district where the respondent was living. If the sample person could not be located at the address given, an intensive search for the current address of the respondent was performed both locally

and through different registers. When the person was traced, the questionnaire was forwarded through the central office to another public health nurse at the new address.

Since the sample to be interviewed was spread over the country, a great number of interviewers had to be involved in the study. The training of the interviewers had to be based mainly on written instructions. These presented the objectives of the study and the general structure of the questionnaire and included detailed instructions on procedure and recording. Two pilot surveys were performed during 1963 covering about 900 interviews in which the organization of the field work was tested. Many of the nurses conducting interviews in the final survey had taken part in these pilot studies.

Altogether 965 interviewers were used; 95 percent of these were public health nurses who performed 72 percent of the interviews. On average, the public health nurses involved conducted 1.5 and the specially employed nurses in the large cities 11 interviews each. Sixty-three percent of the interviewers conducted only one interview. About 40 percent of the public health nurses had known the respondent beforehand.

Letters explaining the objectives of the survey were sent to all respondents from the central office in advance of the interview. It was also suggested that interviewers give notice by telephone or other suitable means before a visit. Interviews were performed with the respondent personally present, but respondents were asked to seek help of other family members and consult any documents in order to provide information which was as reliable as possible. Information about children was always gathered through the adult respondent or his spouse.

The average duration of an interview was about 50 minutes, but there was great variation. Most of the interviews (84 percent) were conducted in February and 13 percent in March, 1964. Some later interviews were accepted because the respondent had been temporarily away from home (e.g., in the hospital) or had moved and was difficult to locate.

United States

The interviews were conducted by NORC's regular interviewing staff. Because of the detailed factual nature and complexity of the survey, special interviewer preparation was emphasized. Detailed specifications for the study were provided each interviewer and up to ten hours of study time was allowed for preparation. In addition, special briefing sessions were held in the larger PSU's. A quiz was designed to test interviewer competence in using the schedule. Each interviewer conducted two practice interviews.

It was anticipated that many families would have little detailed information on their health service use and health insurance readily available. Consequently, letters explaining the study and the information sought were sent to all sample families in advance of an interviewer's visit. These letters, and the interviewers on subsequent visits, urged families to consult any documents such as health insurance policies, membership cards, medical bills, and tax records which could provide reliable information.

The interviewer was instructed on first contact to make an appointment for a time when the family members who knew most about family use of health

services and health insurance would be available. During the interview, main respondents were urged to consult other family members who might be better informed than they were about some questions asked. If important information could not be obtained during the first interview, interviewers were instructed to phone later or make additional personal calls to complete the interview. It was recognized that in instances of change in family composition (other than by birth) during the year and in families consisting of several related but unmarried adults it was unlikely that a single family respondent could give accurate information for the entire year about all family members. In such cases interviewers interviewed separately as many family members as necessary.

While the length of the interview varied a great deal according to family size and amount of services used, the modal length was about two hours. The bulk of the interviewing was done in February, 1964.

Differences in the Interviewing Procedures

The interviewing procedure thus differed in several respects. Each person in the Swedish sample was interviewed personally. The U.S. sample was a household sample and the interviewer was instructed to interview the most knowledgeable family member about the family's health care. Although additional information from other members was sought, there was considerable proxy reporting in the U.S. study.

Proxy respondents sometimes report fewer symptoms and illnesses and less medical care use than would the person himself.[5] The results of a preliminary analysis of this comparative study showed evidence that some negative bias may be operating for reporting of symptoms in the United States compared to Sweden due to this difference in interviewing techniques in the two studies.[6]

Another difference in the interviewing process of the two surveys was the occupation of the interviewer. Public health nurses or other nurses did the interviewing in Sweden while specially trained lay interviewers were used in the United States. It is hard to evaluate the effect of this difference on the comparability of the findings. In one U.S. study of medical-history techniques, it was hypothesized that nurse interviewers would obtain fuller reports of symptoms and illnesses than would lay interviewers, but, in fact, the findings suggested that lay interviewers may obtain even more conditions than nurses.[7]

In the same study it was noted that the nurses seemed to feel under pressure to interpret the responses, to look for the medical significance of the interview reports. It is possible that this is especially true for the kind of question about the respondent's overall evaluation of his health which was used in our studies. It may then be that some bias was working in Sweden toward more interviewer influence on the answers about perceived level of health.

[5] NCHS (1965, Series 2, No. 7, p. 15).

[6] Andersen, Anderson and Smedby (1968).

[7] NCHS, Series D, No. 1 (1960), pp. 18–19.

VERIFICATION AND ESTIMATION PROCEDURES

Sweden

Some of the interview data used for this study have been checked against independent information. It has already been described how health insurance records were used for the sampling procedure, involving stratification by disability according to these records. Other data from the health insurance records have also been used to supplement or verify interview reports. All income data were collected from a special registry and were thus not derived from interviews at all.

Respondent reports on hospitalization during the survey year were checked against data on hospital care in the health insurance records. Furthermore, mail questionnaires were sent to individual hospitals to verify reports on hospitalization. Hospital and insurance records revealed additional admissions which have been included in the final analysis. On the other hand, some interview reports on hospital care were excluded because independent information failed to substantiate them. This was especially the case when hospital care was found to have taken place outside the survey year and it seemed probable that this had been wrongly reported by the respondent as hospital care during the year. All interview reports lacking independent verification were not excluded, however. Some incompleteness was known to exist in the insurance records which made a complete hospital verification procedure difficult. Therefore, interview data were sometimes accepted as the only source of information. As a net result of this procedure, the number of admissions in the final analysis exceeded the number initially reported at interview by 10 percent.

Hospital and insurance data were used to improve the accuracy of the details regarding the admissions and to determine how the admission fit into the criteria required by this study. When discrepancies occurred between different sources, hospital reports were generally given preference over insurance data which in turn were regarded as more valid than interview reports. In cases where discrepancies were found, respondents mainly seemed to overreport the length of hospital stays.

Data on the use of prescribed drugs were derived both from interviews and through a special study of prescription forms collected during 1963 from all the pharmacies in Sweden.[8] The prescription study covered only drugs partly or completely paid for by the health insurance. This, however, represents the bulk of prescribed drugs in Sweden. Because of a 20 percent loss in the collection of prescription forms, the data derived from this study could not be used for definite verification of interview reports on use of prescribed drugs. However, the two sources of information were combined. For the final analysis a person was regarded as a user of prescribed drugs if there was an affirmative interview report in this respect or if he was identified as a user in the prescription study.

Health insurance data on physician care, available as claims for reimbursement of physician visit charges, were not generally used to verify interview reports. One reason for this is that problems of incompleteness occurred as for the prescription study. However, when the interview reports gave no information or incomplete information on physician visits, the number of visits according to insurance data was used as an estimate of the number of visits. This estimation procedure was used for less than one percent of the sample.

[8] A detailed description of this study is published by Smedby (1966).

United States

Two separate verification procedures were used to increase the validity of hospital and health insurance data. In the hospital verification study the interview reports of the hospitalization of family members were checked against the records of institutions—hospitals, sanitaria, etc.—and insurance organizations. The hospitalized person or another responsible family member was asked to sign a permission form authorizing the institution to provide detailed information on his stay.

As a result of a mail questionnaire verification, institutional records revealed a few stays for patients with multiple admissions in addition to the stays initially reported by the family. Of all reported admissons 5 percent were excluded from the final analysis because independent information failed to substantiate a stay reported by the family. These stays were about equally divided between those which the hospital reported occurred totally before or after the survey year 1963 and those for which the hospital had no record of any inpatient care for the patient since January 1, 1962, although in the latter instance the patient may have received outpatient care from the hospital. Not all stays which were not substantiated were rejected, since the proper hospital may not always have been contacted. In addition, while hospital record data were generally given preference, in a few instances data provided by the respondents were accepted because of their apparent validity and documentation.

The verification data were used to improve the accuracy of the details regarding the admission. Discrepancies between the family reports of hospitalizations and the official records tended to be minor although there was an inclination for families to overreport the length of the hospital stays.

An attempt was also made to validate all health insurance coverage reported by the sample. Mail questionnaires were sent to insuring organizations for non-group enrollment and to both employers and insurers for group enrollment. Additional information was obtained from the hospital verification since this verification included questions on insurance benefits. From this information policies could be verified and additional coverage sometimes discovered. As a result of the health insurance verification, 4 percent of the initially reported policies were excluded from the final analysis. The number of additional policies revealed by the verification procedure corresponded to 2 percent of all reported policies.[9]

In cases in which necessary quantitative information was not obtained at all in the interview or in which it was not obtained in sufficiently precise terms, estimates were made in the central office during the processing stage. Estimates made were based on other data from the interview and on information relating to "going rates" in the community from which the sample family came.

[9] A detailed account of the health insurance verification procedure can be found in Andersen and Riedel (1967).

Effects of Differences in Verification and Estimation Procedures

In both Sweden and the United States verification studies were performed to increase the validity of interview data on hospitalization. While both procedures resulted in some interview reports on hospital care being rejected, the Swedish procedure was more likely to discover hospital care not reported in the interview. This resulted in a 10 percent net increase of the number of hospital admissions in Sweden. In the U.S. study there was no feasible check on the validity of reports of no hospitalization.[10] Thus, the different possibilities of verifying hospital care in the two studies apparently have resulted in a bias toward lower hospital admission rates in the United States.

In Sweden, data on use of prescribed drugs are based on both interviews and prescription data, while in the United States only interview data were available. This difference has resulted in some bias toward higher figures for Sweden. Eight percent of all Swedish respondents were identified as users by prescription data although they did not report this use in the interview.

Data on physician care are mainly based on interviews in both countries, although different estimation procedures were used for incomplete interview reports. Surely, both underreporting and overreporting occurred in both countries, using a recall period as long as a year. There is no reason to believe, however, that this has resulted in relatively fewer visits being reported in one country than in the other.

[10] A methodological study by the Survey Research Center comparing interviews with hospital records estimated that U.S. respondents underreport hospital admissions by 10 percent. See NCHS (1965, Series 2, No. 6).

APPENDIX B

DESCRIPTION OF VARIABLES

This appendix includes definitions of variables used for the cross tabulations and the AID-analyses.[1] It is divided into sections on dependent variables and independent variables, the latter with subsections for predisposing, enabling, and illness variables. Table B-1 gives the marginals for all variables described.

DEPENDENT VARIABLES

(1) *Physician care.*—Fact of at least one visit by the person to a physician's office or clinic when the person was actually examined or treated by the doctor or a visit by the doctor in the person's home during 1963. No distinction is made between visits for illness and other visits; thus, physician visits for preventive measures, prenatal care and general check-ups are included. However, nurse visits (visits to a physician's office when the doctor did not see the person himself), public health nurse visits, and telephone calls to a physician are generally excluded.[2] (For Swedish children under 16 some nurse visits in a physician's office and a few telephone calls to a physician might have been included with physician visits.)

The source of information is interview data. For a few Swedish cases with missing or incomplete interview data, supplementary information on physician visits is taken from health insurance records.

(2) *Number of physician visits.*—Sum of all visits during 1963 described as included in variable (1). Excludes visits to hospital inpatients. Sources of information same as for variable (1).

(3) *Hospital care.* Fact of at least one spell of in-patient care, falling partially or totally into 1963, in a hospital, sanatorium, convalescent home, or nursing home. Excludes care associated with pregnancy disorders or delivery.

The Swedish data are based on interview reports and verification provided by hospitals and the national health insurance records. The U.S. data are based on interview reports and verification provided by hospitals and voluntary health insurance organizations. The Swedish verification procedure was more likely to discover hospitalizations not reported in the interview than was the U.S. procedure. In the latter case there was no feasible check on the validity of reports of no hospitalization.

(4) *Number of hospital days.*—Sum of in-patient days during 1963 associated with all care recorded in variable (3). Sources of data as reported for variable (3).

[1] Tables 6–11 of the text include 38 persons in the U.S. sample whose age was not known. These people were excluded from the subsequent cross-tabulations and AID analyses.

[2] A breakdown by all kinds of physician and nurse contacts is given in Table 7, however.

TABLE B-1

NUMBER OF PERSONS WITHIN DIFFERENT CLASSES OF THE VARIABLES USED IN THE STUDY

VAR. No.	VARIABLE NAME	CLASSES	SWEDEN				UNITED STATES	
			All ages		21 and over			
			Unweighted	Weighted	Unweighted	Weighted	All ages[a]	21 and over
1...	Physician care	No	799	11065	447	7770	2739	1536
		Yes	2007	24781	1329	16726	4972	2918
2...	Number of physician visits	Continuous	.....	Mean 3.6	.....	Mean 4.0	Mean 6.2	Mean 7.5
3...	Hospital care	No	2374	32810	1425	22336	7093	4023
		Yes	432	3036	351	2160	618	431
4...	Number of hospital days	Continuous	.....	.....	.....	Mean 24.3	.....	Mean 14.5
5...	Use of prescribed drugs	No	.....	.....	500	9220	.....	2358
		Yes	.....	.....	1276	15276	.....	2096
6...	Dental care	No	.....	.....	1164	14530	.....	2739
		Yes	.....	.....	612	9966	.....	1715
7...	Age	0–5	334	3243	.....	.....	971	.....
		6–10	258	2493	.....	.....	874	.....
		11–15	303	2548	.....	.....	765	.....
		16–20	135	3066	.....	.....	647	.....
		21–29	198	3866	198	3866	869	869
		30–44	376	6650	376	6650	1435	1435
		45–54	349	5288	349	5288	860	860
		55–64	342	4348	342	4348	595	595
		65 and over	511	4344	511	4344	695	695
8...	Sex	Male	1412	18298	863	12394	3760	2111
		Female	1394	17548	913	12102	3951	2343
9...	Marital status	Single	1370	16012	348	4854	3571	390
		Married	1122	16778	1114	16586	3482	3423
		Widowed	233	2204	233	2204	434	434
		Divorced/ separated	81	852	81	852	224	207
10...	Family size	One	411	4882	393	4492	379	372
		Two	556	6940	539	6600	1233	1170
		Three	600	7999	389	5720	1272	884
		Four	615	8380	260	4496	1612	853
		Five	357	4185	120	1860	1289	556
		Six or more	267	3460	75	1328	1926	619
11...	Education	Low	.....	.....	1457	19064	.....	1796
		Middle	.....	.....	231	3752	.....	1565
		High	.....	.....	88	1680	.....	898
		NA	.....	.....	.....	.....	.....	195

[a] For all variables 38 NA's on age are excluded.

TABLE B-1—*Continued*

VAR. No.	VARIABLE NAME	CLASSES	SWEDEN				UNITED STATES	
			All ages		21 and over			
			Unweighted	Weighted	Unweighted	Weighted	All ages[a]	21 and over
12...	Social class[b]	Low	1377	16607	848	11212	4164	2344
		Middle	734	10338	470	7328	2359	1438
		High	164	2570	88	1544	423	218
13...	Farm/non-farm	Farm	457	5707	307	3920	552	329
		Non-farm	2275	29515	1406	20084	6946	4000
		NA	74	624	63	492	213	125
14...	Race	White	.....	.....	.....	.....	6542	3867
		Non-white	.....	.....	.....	.....	1169	587
15...	Income	Low	775	8779	506	5486	1575	1000
		Medium low	518	6145	367	4008	992	594
		Medium	764	9794	486	7238	2159	1130
		Medium high	453	6624	255	4606	2141	1229
		High	296	4504	162	3158	844	501
16...	Health insurance	Insured	.....	.....	.....	.....	5314	3112
		Uninsured	.....	.....	.....	.....	2397	1342
17...	Residence	Large urban	522	6504	357	4706	1536	967
		Other urban	912	11614	552	7782	3633	2063
		Rural	1372	17728	867	12008	2542	1424
18...	Region	(Sweden)						
		North	624	7624	366	4834	.....	.....
		South	2182	28222	1410	19662	.....	.....
		(U.S.)						
		North East	.....	.....	.....	.....	1579	992
		North Central	.....	.....	.....	.....	2217	1274
		South	.....	.....	.....	.....	2553	1430
		West	.....	.....	.....	.....	1362	758
19...	Number of symptoms reported	None	.....	.....	394	6890	.....	1738
		One	.....	.....	367	6102	.....	974
		Two	.....	.....	252	3874	.....	611
		Three	.....	.....	220	2708	.....	404
		Four or five	.....	.....	257	2502	.....	428
		Six or more	.....	.....	286	2420	.....	299
20...	Level of health	(Sweden)						
		Good	.....	.....	887	16756	.....	.....
		In between	.....	.....	584	6256	.....	.....
		Poor	.....	.....	300	1444	.....	.....
		NA	.....	.....	5	40	.....	.....
		(U.S.)						
		Excellent	.....	.....	.....	.....	.....	1605
		Good	.....	.....	.....	.....	.....	1767
		Fair	.....	.....	.....	.....	.....	753
		Poor	.....	.....	.....	.....	.....	272
		NA	.....	.....	.....	.....	.....	57
	Total	.....	2806	35846	1776	24496	7711	4454

[b] Excludes farm population and NA's. The sum of the observations in Low, Middle and High corresponds to the number of observations in the non-farm category of variable 13.

(5) *Use of prescribed drugs.*—Fact of drugs or medicines prescribed by a physician or a dentist and purchased directly from a pharmacy or elsewhere during 1963. Excludes medicines administered by the doctor or the dentist in the office or clinic, medicines received during hospital care, and medicines purchased directly by the patient or his family with no physician's prescription.

The Swedish data are based on interview reports and prescription forms collected from pharmacies through a special survey. The U.S. data are based on interview reports only.

(6) *Dental care.*—Fact of any type of dental services received from a dentist during 1963 such as teeth cleaned, X-rayed, filled, or pulled, or any bridge work done.

The source of information is interview data only in both countries.

INDEPENDENT VARIABLES

PREDISPOSING DEMOGRAPHIC VARIABLES

(7) *Age.*—In Sweden this variable stands for age attained on February 15, 1963, for all persons age 16 or over. (All persons in the sample are born on February 15). For children 0–15, age is calculated as 1963 minus year of birth. In the United States it is age attained at time of interview as reported by respondent. A consequence of these different procedures is that Swedish respondents of a certain age are on average half a year older than U.S. persons for whom the same age was reported.

(8) *Sex.*—In Sweden this variable is based on interview and insurance record data. Children 0–15 with no information on sex were assigned a code randomly. This applies to 43 percent of the Swedish children. In the United States sex is coded as reported in interview.

(9) *Marital status.*—In Sweden marital status refers to the situation on December 31, 1963, according to interview response. In the United States it refers to the situation at the time of the interview according to interview response. U.S. persons with no information on marital status were included in the category "married." All children under 16 were considered single in both countries.

PREDISPOSING SOCIAL STRUCTURE VARIABLES

(10) *Family size.*—Number of family members, including respondent, according to interview.

In Sweden a family was defined to the respondent as "those close to you who live with you and are in a common household." Family size is the sum of all such persons unless there was a second married couple in the household. In such a case this couple and their unmarried children were not included in the family.

In the United States a family was defined as one person, or a group of persons, living together and related to each other by blood, marriage or adoption. However, when there were two related married couples living in a single dwelling unit, each married couple and their unmarried children were

a separate family. Any person who was unrelated to anyone else in the dwelling unit was regarded as a separate family.

(11) *Education.*—Formal schooling of individual according to interview.

Sweden:

Low = elementary school (folkskola, enhetsskola eller grundskola).
Middle = secondary school (with or without examination) (realskola, flickskola, realexamen, normalskolekompetens eller liknande).
High = gymnasium (with or without examination) or higher (gymnasium eller högre).

United States:

Low = 0–10 years of formal schooling.
Middle = 11–12 years of formal schooling.
High = 13 years or more of formal schooling.

(12) *Social class.*—The coding of this variable is based on interview report on occupation of family head (Sweden) or family main earner (United States) for all persons defined as part of family. Coded according to previous occupation if head/main earner was retired. The farm population is not included in the social class grouping but identified in variable (13) described below.

Sweden:

Low = laborers, service workers, operatives, salaried craftsmen.
Middle = clerical and sales workers, foremen, self-employed craftsmen, small business proprietors, nurses, elementary school teachers.
High = other professionals and academically trained persons, high officials, proprietors and managers of large business and industry.

United States:

Score from Duncan's Scale of Occupational Prestige for Family Main Earner (excluding the farm population).[3]

Low = 0–39
Middle = 40–79
High = 80 or more

(13) *Farm/non-farm.*—Source of information as for variable (12). In Sweden the farm code includes farm owners, foremen and workers in farming, forestry, or fishing and their families. In the United States it includes farm owners, foremen and laborers in farming, only, and their families. The non-farm group includes all other persons and corresponds to the sum of the low, middle, and high social class group in variable (12) for both countries.

(14) *Race.*—Not coded in Sweden. In the United States coding is based on interviewer's observations of main respondents. Respondents with no information on race were considered as white.

[3] Duncan (1961).

ENABLING FAMILY RESOURCES VARIABLES

(15) *Income.*—In Sweden income is based on record data from the Central Bureau of Statistics. It is the sum of taxable income of respondent and spouse, if any, for 1963 (or latest available year before 1963). This does not correspond to the real family income in some cases since income for other adult family members is not included. Thus, for young, single respondents over 16 who still live with their parents, it does not include income of the parents. For children under 16, however, it is the sum of taxable income for the parents.

Low = 0–4,999 kr.
Medium low = 5,000–9,999 kr.
Medium = 10,000–19,999 kr.
Medium high = 20,000–29,999 kr.
High = 30,000 kr. and over.
(5 kr. = $1.00).

In the United States income is based on interview report. It is the sum of money income before taxes for all family members for 1963, including interest, dividends, and pensions.

Low = $0–3,499.
Medium low = $3,500–4,999.
Medium = $5,000–$7,499.
Medium high = $7,500–12,499.
High = $12,500 and over.

(16) *Health insurance.*—Not coded in Sweden. In the United States coding is based on interview report and verification provided by insuring organizations, employers and hospitals. "Insured" means some kind of health insurance in effect December 31, 1963.

ENABLING COMMUNITY RESOURCES VARIABLES

(17) *Residence.*—Urban or rural nature of comunity of residence. In Sweden coding is based on record data and the urban-rural distinction follows official administrative divisions of Sweden:

Large urban = three largest cities (Stockholm, Göteborg, Malmö).
Other urban = other cities and administratively defined towns (övriga städer).
Rural = small rural towns and other rural communities (landsbygd).

In the United States coding is based on the definition of urban and rural areas used in the 1960 Census of Population:

Large urban = urban areas in the ten largest Standard Metropolitan Statistical Areas.
Other urban = other urban areas.
Rural = rural areas.

(18) *Region.*—The geographical section of the country in which the person lives.

Sweden:

North = six northern-most counties of Sweden (Kopparberg, Gävleborg, Västernorrland, Jämtland, Västerbotten, and Norrbotten counties).
South = remaining part of Sweden.

United States:

North East = Maine, N.H., Vt., Mass., R.I., Conn., N.Y., N.J., Penn.
North Central = Ohio, Ind., Ill., Mich., Wisc., Minn., Ia., Mo., N. Dak., S. Dak., Neb., Kan.
South = Del., Md., D.C., Va., W. Va., N.C., S.C., Ga., Fla., Ky., Tenn., Ala., Miss., Ark., La., Okla., Tex.
West = Mont., Idaho, Wym., Col., N.M., Ariz., Utah, Nev., Wash., Ore., Cal.

PERCEIVED ILLNESS VARIABLES

(19) *Number of symptoms reported.*—Based on interview report from respondent in Sweden and from person or proxy respondent in the United States. For each symptom on a check list the respondent was asked if he had experienced the symptom during 1963. His score for this variable was the total number of these symptoms he reported. The following symptoms were included on the list:

Sweden:	*United States:*
1. Hosta på dagen eller nattetid som varade tre veckor.	1. Cough any time during the day or night which lasted for three weeks.
2. Plötsliga attacker av svaghet eller svimningskänsla.	2. Sudden feelings of weakness or faintness.
3. Trötthetskänsla i flera veckor utan särskild anledning.	3. Feeling tired for weeks at a time for no special reason.
4. Huvudvärk ofta.	4. Frequent headaches.
5. Diarré (lösa avföringar) i fyra till fem dagars tid.	5. Diarrhea (loose bowel movement) for four or five days.
6. Andfåddhet även efter lätt arbete.	6. Shortness of breath even after light work.
7. Stelhet eller värk i leder eller muskler på morgnarna.	7. Waking up with stiff or aching joints or muscles.
8. Smärtor eller svullnad i någon led på dagarna.	8. Pain or swelling in any joint during the day.
9. Ont i ryggen ofta.	9. Frequent backaches.
10. Viktminskning 5 kilo eller mera utan särskild anledning.	10. Unexplained loss of more than ten pounds in weight.
11. Återkommande smärtor i hjärtat eller hjärttrakten.	11. Repeated pains in or near the heart.
12. Återkommande matsmältningsbesvär eller "dålig mage."	12. Repeated indigestion or upset stomach.

13. Ont i halsen eller snuva med 38° feber eller högre i åtminstone två dagar.	13. Sore throat or running nose with a fever as high as 100° F for at least two days.
14. Buksmärtor (ont i magen) i åtminstone ett par dagar.	14. Abdominal pains (pains in the belly or gut) for at least a couple of days.
15. Inflammation, smärtor eller irritation i ögonen eller öronen.	15. Any infections, irritations, or pains in the eyes or ears.

(20) *Level of health.*—Based on interview report from respondent in Sweden and from person or proxy respondent in the United States. The questions aimed at an overall evaluation of the person's perceived health during 1963.

Sweden:	*United States:*
Good (gott).	*Excellent.*
In between (något däremellan).	*Good.*
Poor (dåligt).	*Fair.*
	Poor.

APPENDIX C

ANALYSIS TECHNIQUES

AGE ADJUSTING PROCEDURE FOR ESTIMATES AND STANDARD ERRORS OF ESTIMATES

The cross tabulation analysis presented in Chapters V–VII and Tables 14–43 involves age adjusting of estimates and standard errors of estimates. The reason for the age adjustment is that age is not only generally associated with use of health services but also with other independent variables such as marital status, education, income, and illness. Furthermore, the Swedish population is somewhat older than the U.S. population. The age adjusting allows us to compare use of health services between groups within one country or between groups from different countries after the effect of the age structure of the groups has been eliminated.

The adjusted estimate was formed as a weighted estimate, using the age distribution of a standard population for weighting. The standard population was the U.S. sample of interviewed persons. Different subpopulations have been used, however, depending on whether children were included in the table or not and depending on the kind of medical care use. For mean number of physician visits and mean number of hospital days, the standard populations were restricted to persons in the U.S. sample using these services. Persons in the U.S. sample without information on age had to be excluded from the standard populations. The populations used and the corresponding sets of weights are shown in Table C-1.

TABLE C-1

STANDARD POPULATIONS USED FOR THE AGE ADJUSTING PROCEDURE

AGE GROUP	ALL PERSONS		PERSONS WITH PHYSICIAN VISITS		PERSONS WITH HOSPITAL CARE	
	No. in U.S. sample	Weights	No. in U.S. sample	Weights	No. in U.S. sample	Weights
Children included						
0–15	2,610	.338	1,672	.336		
16–44	2,951	.383	1,889	.380		
45–64	1,455	.189	950	.191		
65 and over	695	.090	461	.093		
Total	7,711	1.000	4,972	1.000		
Adults only						
21–44	2,304	.517	1,507	.516	181	.420
45–64	1,455	.327	950	.326	162	.376
65 and over	695	.156	461	.158	88	.204
Total	4,454	1.000	2,918	1.000	431	1.000

As seen from Table C-1 three age groups have been used for tables including adults only. Four age groups were included when persons of all ages were analyzed. The lowest age group was chosen to include ages 0–15 because of the special sampling technique for this age group in Sweden (see Appendix A).

The following section describes the formulas used for the calculation of age adjusted estimates and age adjusted standard errors of estimates. Because of the Swedish stratified sampling technique, special calculations are necessary for Sweden. The procedure will be described separately for the two countries.

United States

The following symbols will be used:

n_i = number of observations in age group *i*
p_i = percent (using a service) in age group *i*
m_i = mean (of number of visits or number of hospital days) in age group *i*
se_i = standard error (of percentage or mean) in age group *i*
w_i = weight for age group *i*
P = age adjusted percentage
M = age adjusted mean
SE = age adjusted standard error

The simple standard errors for individual age groups are calculated according to basic statistical formulas for pure random samples.[1] The age adjusting is then performed according to the following formulas:

$$P = \frac{\Sigma w_i p_i}{\Sigma w_i}$$

Because the weights are chosen in such a way that the sum of the weights (Σw_i) always equals 1, the formula can be simplified:

$$P = \Sigma w_i p_i \quad (1)$$

$$M = \frac{\Sigma w_i m_i}{\Sigma w_i} = \Sigma w_i m_i \quad (2)$$

$$SE = \sqrt{\frac{\Sigma w_i^2 se_i^2}{(\Sigma w_i)^2}} = \sqrt{\Sigma w_i^2 se_i^2} \quad (3)$$

The weighting formulas require that there are observations in all age groups for each category of the independent variables. For the calculation of the simple standard error within an age group it is further necessary that there are least two observations within each category and age group. In a few instances, where this was not the case, two categories of the independent variable were combined (see Tables 22 and 23).

As an example, let us consider the calculation of the age adjusted percent of single adult persons who saw a doctor in the United States during the survey year. Age specific figures, necessary for the calculation, are given in the table below. The totals of the table give the non-adjusted percentage for all persons in this group with the corresponding non-adjusted standard error.

[1] The U.S. sample was, in fact, a clustered sample. The standard errors, calculated as for pure random samples, are somewhat underestimated. Because of this an adjustment of the U.S. standard errors was performed before significance tests were applied. (See p. 159.)

Age group	No. of observations	Percent seeing a doctor	Standard error of percentage	Weight of age group
21–44	n_1=309	p_1=52.4	se_1=2.85	w_1=.517
45–64	n_2= 56	p_2=57.1	se_2=6.67	w_2=.327
65 and over	n_3= 25	p_3=72.0	se_3=9.17	w_3=.156
Total (unweighted)	390	54.4	2.52	

The age adjusted figures are calculated according to formulas (1) and (3) above:

$$P = .517 \times 52.4 + .327 \times 57.1 + .156 \times 72.0 = 57.0$$

$$SE = \sqrt{(.517)^2(2.85)^2 + (.327)^2(6.67)^2 + (.156)^2(9.17)^2} = 3.00$$

In this case, the adjustment to the age structure of the total sample of U.S. adults will increase the percentage seeing a doctor from 54.4 to 57.0. The corresponding standard error changes from 2.52 to 3.00.

Sweden

The Swedish interview sample was drawn as a stratified sample with different sampling quotients for different strata. (See Appendix A and Table A-1.) Weights had to be assigned to the different strata in order to calculate estimates which were representative of the total population. To arrive at age adjusted estimates two kinds of weighting procedures had to be applied: weighting by stratum and weighting by age group.

In calculating age adjusted estimates for a certain category of persons, e.g., single adults, the category had to be subdivided by stratum and age group. For each subgroup, consisting of persons belonging to the same stratum and the same age group, percentages, means and simple standard errors were calculated. If there were no observations in the subgroup, the standard error was set to 0. (If there was just one case, the standard error used was the standard deviation of the total sample.)

The weighting was then done as a two stage procedure. First, estimates for age groups were calculated so that persons from different strata but within the same age group were weighted together using the stratum weights. These estimates for different age groups were then weighted together using the weights for different age groups, derived from the appropriate standard population.

For the formulas a modification of the above symbols will be used:

$n_{i,j}$ = number of observations in age group *i* and stratum *j*
$p_{i,j}$ = percent in age group *i* and stratum *j*
$m_{i,j}$ = mean in age group *i* and stratum *j*
$se_{i,j}$ = standard error in age group *i* and stratum *j*
k_j = weight for stratum *j*

As above, p_i, m_i and se_i (with single subscripts) stand for percentage, mean, and standard error for age group *i* as a whole.

The weighted estimates for age group *i* were calculated according to the following formulas where the summations are made over strata:

$$p_i = \frac{\Sigma k_j n_{i,j} p_{i,j}}{\Sigma k_j n_{i,j}} \quad (4)$$

$$m_i = \frac{\Sigma k_j n_{i,j} m_{i,j}}{\Sigma k_j n_{i,j}} \quad (5)$$

$$se_i = \sqrt{\frac{\Sigma (k_j n_{i,j} se_{i,j})^2}{(\Sigma k_j n_{i,j})^2}} \quad (6)$$

Age adjusted estimates for the group as a whole were then calculated according to formulas (1)–(3) above.

As an example, let us consider the calculation of the age adjusted percent of adult persons with low education who saw a doctor in Sweden. Basic data necessary for the calculations are given in the table below.

Age Group	Stratum I $k_1=4$	Stratum II $k_2=8$	Stratum III $k_3=2$	Stratum IV $k_4=24$	Weight of Age Group
21–44.....	$n_{1,1}=19$ $p_{1,1}=63.2$	$n_{1,2}=0$ $p_{1,2}=0.0$	$n_{1,3}=108$ $p_{1,3}=97.2$	$n_{1,4}=273$ $p_{1,4}=65.2$	$w_1=.517$
45–64.....	$n_{2,1}=63$ $p_{2,1}=74.6$	$n_{2,2}=0$ $p_{2,2}=0.0$	$n_{2,3}=217$ $p_{2,3}=99.1$	$n_{2,4}=317$ $p_{2,4}=62.5$	$w_2=.327$
65 and over...	$n_{3,1}=11$ $p_{3,1}=63.6$	$n_{3,2}=402$ $p_{3,2}=66.7$	$n_{3,3}=21$ $p_{3,3}=100.0$	$n_{3,4}=26$ $p_{3,4}=69.2$	$w_3=.156$

According to formula (4) the percentage of age group 21–44, weighted over all four strata, can be calculated as:

$$p_1 = \frac{4 \times 19 \times 63.2 + 8 \times 0 \times 0.0 + 2 \times 108 \times 97.2 + 24 \times 273 \times 65.2}{4 \times 19 + 8 \times 0 + 2 \times 108 + 24 \times 273} = 66.2$$

In the same way the weighted percentages for age groups 45–64 and 65 and over can be calculated as:

$p_2 = 64.7$
$p_3 = 67.4$

Using formula (1), the age adjusted percentage is then calculated as:
$P = .517 \times 66.2 + .327 \times 64.7 + .156 \times 67.4 = 65.9$

The above example is chosen because of its relative simplicity. When children are included, there is an additional age group. Furthermore, the number of strata in age group 0–15 is theoretically eight (see Table A-1). All of these strata did not include observations, however, and some had the same weight. In practice, the number of strata in age group 0–15 was reduced to five.

Significance Tests of Differences

In Tables 14–43 the standard errors of the age adjusted estimates have been presented together with the estimates because they measure the confidence that

can be placed in these estimates. When the difference between percentages or means for two groups is calculated, the standard error of this difference can easily be calculated if the standard errors of the estimates are known. These standard errors guided the comments to the tables in Chapters V–VII.

Differences between groups with respect to percentages and means can be calculated in various ways. Thus, two groups within the same country can be compared (e.g., males and females in Sweden). Group comparison can also be made between countries (e.g., males in Sweden and males in the United States). A third kind of comparison refers to the difference between two groups in one country compared to the difference between the corresponding groups in the other country (e.g., the difference between males and females in Sweden compared to the difference between males and females in the United States). This last kind of comparison is the most essential in our study which concentrates on differences between the two countries in medical care use related to explanatory variables.

Differences have been tested with respect to the confidence that can be placed in them. Only differences which reach the .05 level of significance have been commented upon in the text unless otherwise indicated. Non-significant differences mentioned in the text have been marked by daggers (†). Significance tests have been performed using traditional rules for the testing of differences. This means that a difference is regarded as significant at the .05 level if it is greater than twice its standard error.

It must be noted, however, that the standard errors for the U.S. estimates given in the tables have been adjusted before this procedure. The reason for the adjustment is that the standard errors are calculated as if the U.S. sample was a simple random sample. In fact, it was a clustered sample, which means that the standard errors given in the tables are underestimated. Therefore, all U.S. standard errors have been multiplied by a factor 1.4 before significance tests have been applied. We believe that this adjustment is more likely to result in an overestimate than in an underestimate of the standard error. The factor 1.4 is based on the estimates of standard errors in the U.S. sample which have been published by Andersen and Anderson (1967, Table A-1, pp. 168–170).

PARTIAL ASSOCIATION TECHNIQUE USED IN CHAPTER VIII

In Chapter VIII we examined the association between income and use of health services controlling for social class as well as the association between social class and use controlling for income. The reason for these special analyses was the high correlation between income and social class.

The technique used here is similar to the one just described for the age adjusting procedure. The age adjusting means that we control for age. Now we want to control for income or social class instead.[2] The analysis is presented for particular age groups as well as for the several age groups taken together. In the latter instance no age adjusting is performed.

In describing the technique we will make use of a numerical example. The following definitions of symbols refer to the U.S. sample:

[2] The technique we have used is a special case of a more general approach described by Goodman (1965).

n_a = number of observations in group *a*
p_a = percent (using a service) in group *a*
se_a = standard error (of percentage) in group *a*

Each observation is placed in one of the four groups *a*, *b*, *c*, or *d*, defined according to income and social class. This grouping is demonstrated in the following table. This table shows the percent of adults by social class and income who saw a dentist during the survey year in the United States.

Low Social Class		High Social Class	
Low income (a)	High income (b)	Low income (c)	High income (d)
n_a=1,602.....	n_b=742	n_c=739	n_d=917
p_a= 26.5....	p_b= 44.3	p_c= 42.5	p_d= 57.9
se_a= 1.10...	se_b= 1.82	se_c= 1.82	se_d= 1.63

The income difference, controlling for social class, is calculated in the following way. First the percentage income difference among lower class people and the percentage income difference among higher class people are calculated. These two income differences are then weighted together using the proportions of lower class people and higher class people in the sample as weights.

The income difference for people of low social class (d_{ba}) and the standard error of this difference (se_{ba}) are defined as follows:

$$d_{ba} = p_b - p_a$$

$$se_{ba} = \sqrt{se_a^2 + se_b^2}$$

Using the numerical example:

$$d_{ba} = 44.3 - 26.5 = 17.8$$

$$se_{ba} = \sqrt{1.10^2 + 1.82^2} = 2.13$$

The income difference for people of high social class (d_{dc}) and its standard error (se_{dc}) are calculated in the corresponding way:

$$d_{dc} = p_d - p_c = 57.9 - 42.5 = 15.4$$

$$se_{dc} = \sqrt{se_c^2 + se_d^2} = \sqrt{1.82^2 + 1.63^2} = 2.44$$

A weighted income difference (D_{income}) is then calculated:

$$D_{income} = \frac{(n_a + n_b)d_{ba} + (n_c + n_d)d_{dc}}{n_a + n_b + n_c + n_d} = 16.8$$

The standard error for this difference is calculated as the following square root expression:

$$\sqrt{\frac{(n_a + n_b)^2 se_{ba}^2 + (n_c + n_d)^2 se_{dc}^2}{(n_a + n_b + n_c + n_d)^2}} = 1.61$$

The income difference (D_{income}) in our example is great in relation to its standard error. If we adjust the standard error by multiplying by the factor 1.4—mentioned above as giving a rough approximation of the likely standard error of the clustered U.S. sample—the difference is well over two times its standard error (16.8/1.61 × 1.4 = 7.5), thus indicating a significant income difference.

The social class difference, controlling for income, is calculated in the corresponding way, *viz.*:

$$d_{ca} = p_c - p_a$$

$$d_{db} = p_d - p_b$$

$$D_{class} = \frac{(n_a + n_c)d_{ca} + (n_b + n_d)d_{db}}{n_a + n_b + n_c + n_d}$$

etc.

For Sweden the following symbols may be defined:

n'_a = the sum of the products between the stratum weight and the number of observations in each stratum for group *a*

p'_a = percent using a service, weighted over all individuals in group *a*, using the stratum weights as weights

se'_a = the standard error of this percentage.

Thus, p'_a is calculated according to a formula analogous to formula (4) in the earlier section on age adjusting and se'_a according to a formula analogous to formula (6).

With the basic symbols redefined in this way, the calculation of differences and their standard errors is performed for Sweden according to the formulas given above for the U.S. data.

The calculations have been made both for specific age groups and for all age groups taken together using the same formulas. The adjusted income differences (D_{income}) are presented in Table 44 (p. 84) and the adjusted class differences (D_{class}) in Table 45 (p. 86) for different age groups and different types of use. Some of the income and class specific percentages on which these tables are based are presented in Table C-2.

MULTIVARIATE TECHNIQUE

The AID Program

In the AID analysis a dependent variable (Y) is studied in relation to a series of independent variables or predictors ($X_1, X_2, \ldots X_k, \ldots$). The program subdivides the original sample through a series of dichotomous splits with respect to the predictors into a number of mutually exclusive subgroups. This is achieved through a stepwise procedure. In the first step that predictor and the split of that predictor is chosen which explains as much as possible of the total sampling variance. Through this first split the original sample is divided into two subgroups. In the second step, starting with the subgroup with the greatest variance, the program chooses that predictor and that split which explains as much as possible of the remaining variance. The analysis goes on with successive splits so that at each step that split is made which explains as much as possible of the remaining variance of the parent group. Certain restrictions are set which regulate and finally terminate the process.

TABLE C-2

PERCENT USING SERVICES ACCORDING TO INCOME AND SOCIAL CLASS[a]

TYPE OF SERVICE AND COUNTRY	LOW SOCIAL CLASS		HIGH SOCIAL CLASS	
	Low income	High income	Low income	High income
Physician care				
Sweden	66.9	72.2	71.0	70.9
U.S.	59.0	63.3	71.0	76.7
Hospital care				
Sweden	8.7	7.4	9.9	5.6
U.S.	8.3	7.7	7.4	8.0
Prescribed drugs				
Sweden	64.3	57.5	63.1	61.3
U.S.	44.5	41.0	49.7	55.1
Dental care				
Sweden	34.0	39.2	49.5	60.5
U.S.	26.5	44.3	42.5	57.9

[a] Excludes members of farm families and persons aged 16–20 for all services. For drugs and dental care all persons under 21 are excluded.

The following is a description of part of the program.[3]

Y_a = value of dependent variable for the ath observation in the data
N = total number of observations in the data
N_i = number of observations in group i
w_a = weight value attached to the ath observation in the data (In our study w_a usually equals one for all observations in the U.S. analyses and equals stratum weight in the Swedish analyses.)

The total sum of squares of the original sample (TSS_t) is defined by the following formula where the summation is extended over all observations in the sample:

$$TSS_t = \Sigma w_a Y_a^2 - \frac{(\Sigma w_a Y_a)^2}{\Sigma w_a}$$

TSS_i is the corresponding sum of squares for the ith group and is defined in the same way but the summation is restricted to the observations in group i.

The between sum of squares (BSS_{ikp}) for group i, predictor X_k, and partition p of this group into two nonoverlapping subgroups is defined as

$$BSS_{ikp} = W_1\bar{Y}_1^2 + W_2\bar{Y}_2^2 - (W_1 + W_2)\bar{Y}_i^2$$

where

$$W_1 = \Sigma w_a \quad \text{and} \quad \bar{Y}_1 = \frac{\Sigma w_a Y_a}{\Sigma w_a}$$

[3] This section is modified from Sonquist and Morgan (1964).

with summation extended over the first p classes of predictor X_k within group i;

$$W_2 = \Sigma w_a \quad \text{and} \quad \bar{Y}_2 = \frac{\Sigma w_a Y_a}{\Sigma w_a}$$

with summation extended over the remaining classes of predictor X_k within group i: and

$$\bar{Y}_i = \frac{W_1\bar{Y}_1 + W_2\bar{Y}_2}{W_1 + W_2}$$

For group i all possible binary splits on all predictors are tried, with restrictions that (a) the classes of each predictor are sorted into descending sequence, using their means with respect to the dependent variable 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) is removed for any predictor specified as monotonic.

The maximum value of BSS_{ikp} over all classes and all predictors determines which partition should be made. This maximum value is called BSS_i.

Certain requirements regulate the partition process. Three constants R, M, and Q are specified and the following requirements must be fulfilled for a group i to be split:

$$R \leq \frac{TSS_i}{TSS_t} \qquad \text{(split eligibility criterion)}$$

$$M \leq N_i \qquad \text{(minimum group size criterion)}$$

$$Q \leq \frac{BSS_i}{TSS_t} \qquad \text{(split reducibility criterion)}$$

If there are no more unsplit groups such that the split eligibility criterion and the minimum group size criterion are met, or if, for those groups meeting them, the split reducibility criterion is not met, or if the number of currently unsplit groups exceeds a specified input parameter, the process terminates.

The split eligibility criterion thus specifies the proportion of the total sums of squares that must be contained in any group if that group is to become a candidate for splitting. The requirement is made to prevent groups with little variation in them from being split. The minimum size criterion prevents groups with small numbers of observations from splitting. The split reducibility criterion specifies what minimum proportion of the total sum of squares has to be explained by the best possible split of a group in order to allow that group to be split. If this requirement is not met, it means that there is no "useful" predictor.

In our presentation of the results of the AID analyses we have given two kinds of statistics, which we have called the gross B^2 and the partial B^2.

By the gross B^2_k we refer to the maximum proportion of variance which could be explained by predictor X_k by one split of the first group ($i = 1$) into two subgroups, *i.e.*

$$\text{Gross } B^2_k = \frac{BSS_{i=1}}{TSS_t}$$

where $BSS_{i=1}$ is the maximum of BSS_{1kp} in the first step of the analysis for predictor X_k.

The statistic called partial B^2_k is the actual proportion of variance explained by predictor X_k in the whole analysis.

$$\text{Partial } B^2_k = \frac{\Sigma TSS_{ik} - \Sigma TSS_{jk}}{TSS_t}$$

where ΣTSS_{ik} is the sum of squares over all *parent* groups actually split by predictor X_k and ΣTSS_{jk} is the sum of squares over all *new* groups formed by splitting a parent group on predictor X_k.

The total proportion of variance explained by the analysis is defined as the sum of the partial B^2's where the summation is extended over all predictors actually used in the analysis.

Rules Used for Stopping

In all the separate analyses for each country which are reported in Chapters IX–XI (Tables 46–54 and Charts 2–9) we used a split eligibility criterion of .02 and a minimum group size criterion of 25.[4] This means that any group that did not contain 2 percent of the total sums of squares or had less than 25 observations was not eligible for further splits.

The split reducibility criterion is the most important for regulating and stopping the analysis. Therefore, it is also the crucial one to set. The standard is like the 1 percent or 5 percent rule for significance tests and, similarly, is somewhat arbitrary.[5]

Since we were mainly interested in making comparisons between the two countries, we wanted to arrive at about the same number of splits for each country in corresponding analyses. In order to achieve this, we adopted different levels of the split reducibility criterion for Sweden and the United States.

Given the same split requirements, the probability of splits taking place is inversely related to sample size and directly related to the total number of possible splits as determined by the number of predictors and the number of classes (minus one) for each predictor. Both sample size and number of predictors differed in the two countries. We therefore set a reducibility criterion for the U.S. analysis and adjusted the criterion for the corresponding Swedish analysis according to the following formula:

$$Q_s = \frac{Q_u\sqrt{N_u}(K_s - P_s)}{\sqrt{N_s}(K_u - P_u)}$$

where—with subscript *s* for Sweden and *u* for the United States—

Q is the split reducibility criterion;
N is the number of observations;
K is the sum of the number of classes over all predictors;
P is the number of predictors.

Using the recommendations of the authors of the program, we set the split reducibility criterion at .006 for all U.S. analyses, except for the analysis of number of hospital days where it was doubled to compensate for the fewer number

[4] These criteria are based on the recommendations of Sonquist and Morgan (1964, pp. 114–119).

[5] Ibid., p. 119.

of observations. We then calculated the value of the criterion to be used in the corresponding Swedish analysis according to the formula above. The actual levels thus used in our analyses are shown in Table C-3.

TABLE C-3

SPLIT REDUCIBILITY CRITERIA USED IN AID ANALYSES

Type of analysis	U.S.	Sweden
Physician care		
Persons 21 and over	.006	.010
Persons under 21	.006	.011
Number of physician visits		
Persons 21 and over	.006	.010
Persons under 21	.006	.011
Hospital care		
Persons 21 and over	.006	.010
Persons under 21	.006	.011
Number of hospital days[a]	.012	.018
Drug use[a]	.006	.010
Dental care[a]	.006	.010

[a] Analysis includes only persons 21 and over.

Finally, for the presentation of our results, we also introduced an additional condition requiring new groups to include at least 5 observations. If the actual analysis resulted in a final group of less than 5 observations, the split was disregarded and the resulting groups were recombined.

Forms of the Variables

The predictors which were included in the different analyses are shown in Tables 46–54. The classes used for each variable were those given in Table B-1 in Appendix B.[6] Only the variables family size and number of symptoms were regarded as monotonic, *i.e.* splits on these variables were allowed only between adjacent classes. All other variables were free, *i.e.* no such restrictions were given for which classes could be combined in the subgroups. In these cases the predictors will have their classes rearranged during the partition scan. They are sorted into descending sequence using the mean value of the dependent variable for each class as a key.

The dependent variables in the analyses of physician and hospital care, drug use, and dental care were simple dichotomy type variables, separating the nonusers from the users of each type of service. For the analyses of number of physician visits and number of hospital days, the dependent variables were constructed

[6] The only exception to this is that the variable social class included the farm/nonfarm variable. Social class thus had five subgroups: low, middle, high, farmer and NA.

to meet the requirements for a continuous scale. However, due to the skewed distribution of each of these two variables, a transformation was used.

In both cases the distribution is skewed in a positive direction, *i.e.* a small number of persons have a great number of visits or a great number of hospital days. 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 means and will contain few observations. When the extreme cases are not split out, the explained variance appears very low because the high users account for so much of the total variance.

The strategy which was used to reduce the problems caused by the skewness of these variables was to transform them using the square root function of the variable for the analysis in each case. For the results displayed in the charts, however, the mean of the dependent variable for each group has been transformed back to the actual number of physician visits or hospital days.

TABLE C-4

VARIANCE EXPLAINED BY PREDICTORS IN POOLED ANALYSES TO DETECT SYSTEM DIFFERENCES APART FROM OTHER EFFECTS—PERSONS 21 AND OVER

PREDICTORS	DEPENDENT VARIABLE IN ANALYSIS[a]					
	Physician care	Number of physician visits	Hospital care	Number of hospital days	Use of prescribed drugs	Dental care
Stage I	Percent of original variance explained[b]					
Age	....	....	....	.027	....	.033
Sex	....	....	....	....	....	....
Marital status	....	....	....	.071	....	....
Family size	....	....	....	.011	....	....
Education	.008	.014	....	.016	....	.072
Social class	.006	....	....	.009	....	....
Farm/non-farm	....	....	....	....	....	....
Income	....	....	....	.020	....	....
Residence	....	....	....	.009	....	....
Symptoms	.058	....	.010	.054	.113	....
Level of health[d]	.021	.135	.084	.014	.012	....
Total	.093	.149	.094	.231	.124[c]	.106[c]
Stage II	Percent of residual variance explained					
Country	.001	.012	.001	.056	.014	.004

[a] Split reducibility criterion = .006 for all analyses.
[b] Figures for individual predictors correspond to partial B^2; total stands for proportion of total variance explained by all predictors used in Stage I.
[c] Total does not equal components due to rounding.
[d] In order to arrive at the same number of categories of this variable for the two countries, U.S. categories fair and poor were combined in these analyses.

Two-stage AID Analysis

The AID program allows a two-stage analysis. After the first stage, which includes an AID analysis as described above, residuals are calculated for each observation in the sample and saved for subsequent analysis. The residual is the difference between the observed value of the dependent variable and the predicted value. The predicted value of the dependent variable is the mean of the final group of which the observation is a member. In the second stage a new analysis is performed using the residual of the dependent variable in the first stage as the new dependent variable.

In Chapter XIII we attempted to study the effects on utilization of the different medical care systems in the two countries apart from the effects of the individual, family, and community differences. This was done by two-stage AID analyses. In the first stage as much as possible of the variation was explained using all available variables other than the country variable. In the second stage the country variable was introduced as a predictor. This made it possible to study how much of the residual variance could be explained by the country variable.

The results of the two-stage analyses for adults in the pooled sample are given

TABLE C-5

VARIANCE EXPLAINED BY PREDICTORS IN POOLED ANALYSES TO DETECT SYSTEM DIFFERENCES APART FROM OTHER EFFECTS—PERSONS UNDER 21

PREDICTORS	DEPENDENT VARIABLE IN ANALYSIS[a]		
	Physician care	Number of physician visits	Hospital care
Stage I	Percent of original variance explained[b]		
Age	.027	....	....
Sex	....	....	....
Marital status	....	....	....
Family size	.020	.094	....
Social class	....	.075	....
Farm/non-farm	....	....	....
Income	....	....	....
Total	.047	.168[c]	.000
Stage II	Percent of residual variance explained		
Country	.002	.036	.000

[a], [b], [c] Footnotes as in Table C-4.

in Table C-4 and for young persons in Table C-5. Which predictors were included in the analyses and which were actually used can be seen from the tables. The tables give for each analysis the proportion of the original variance explained totally and by each predictor in the first stage as well as the proportion of the residual variance explained by the country variable in the second stage.

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