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THE DEMAND FOR NEIGHBORHOOD MEDICAL CARE

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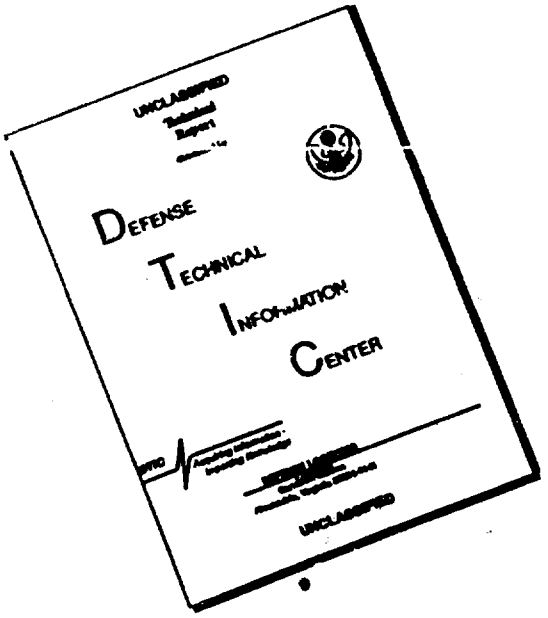

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THE DEMAND FOR NEIGHBORHOOD MEDICAL CARE

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INTRODUCTION

The demand for medical care has been at the center of important debates in welfare economics. Efforts to improve health, particularly the provision of medical services at neighborhood levels under the OEO health center program, have been an important component of anti-poverty activities. Great changes have taken place in government health insurance programs. National health expenditures have grown at a rapid rate to the point where they now exceed 50 billion dollars. With heightened interest in coordinating and integrating the proliferation of government services to the poor, proposals for various forms of community service centers have been born. Health services are central to any effort to combine physical and mental health services, family planning, legal services, referral activities and other municipal and/or social services. The study of health services can provide substantial insights into the demand for municipal and social services generally. Yet there has been little new work on the demand for medical care.

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I would like to thank Dr. Paul Densen, Dr. Nicetas Kuo, Mrs. Ellen Jones and Jerry Weston for their assistance in making materials available. Sid Binder contributed freely of his time in facilitating the data processing activities. Milton Brafman provided conscientious and stimulating research assistance.

While there have been many studies of the demand for medical care in the past, the theory and empirical analysis are still in their relative infancy. Only recently have economists even begun to take into account health as an explicit factor or in the demand for medical care. Important variables such as the extent of insurance coverage and education have been inadequately treated. The role of costs and benefits to society has not been fully explored. Few components of medical care spending have been separately examined even though such institutions as nursing homes and health centers have been growing rapidly. There has been relatively little in the way of economic analysis of the geographic distribution of services, and such efforts have tended to concentrate on the supply side.*

What is perhaps most important in view of the growing concern in the United States with health services for the poor and on reaching ghetto populations with services is that there has been virtually no economic analysis of the demand for medical care in small areas such as sections of a city. Medical care decisions at the neighborhood level primarily involve the choice of ambulatory care, care for which the patient is able to walk in. Indications are that ambulatory care will grow rapidly as policies intended to promote alternatives to costly inpatient care are pursued. There is, in addition, a widespread belief that ambulatory medical care may have a particularly high payoff in improved health.

The following section examines the determinants of the demand for medical care in the aggregate, paying particular attention to the roles of health, insurance, education and social benefits. The demand for neighborhood medical care is subsequently considered. Some of the hypothesized determinants of neighborhood demand are then tested empirically. The statistical analysis considers an entire population--the residents of a housing project for the elderly in which a clinic was established. Determinants of whether or not people use the clinic are analyzed in Chi-Square tests and a dummy variable multiple regression analysis is performed. Some evidence from other clinics is also examined.

* For a review of the literature see Herbert Klarman, The Economics of Health, New York: Columbia University Press, 1965.

THE DEMAND FOR MEDICAL CARE

While it is not possible to delineate factors that are relevant exclusively for the demand for medical care, certain forces which are particularly prominent merit some discussion. In talking about medical care it is not valid to assume a single, homogeneous product. Instead there are a wide range of services being offered at various qualities. The quantity of medical care demanded will in part be determined by health status. We could in principle treat health status as a component of "tastes," following the usual classification of demand variables. However, because of its obvious importance, health is best considered as a separate factor.

The Roles of Health and Income

It has always been obvious to medical care researchers and laymen alike that health plays a dominant role in the demand for medical care. Yet, it is only very recently that economists have shown any serious recognition of this point.* This seems to have been because economists have focused on income and price variables. It is not possible to justify the omission of health by simply arguing that economists are interested in directly examining the impact of more ultimate determinants of health on the demand for medical care. Even if this were the case, it would still be quite valuable to separate the effects of broad proxy variables such as education and urbanization into those components of the effect of each variable on the demand for medical care which reflect changing health status and those which reflect taste variation among groups with comparable levels of health.**

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* For example Ronald Anderson and Lee Benham, "Family Income and Medical Care Consumption," paper presented at the Second Conference on Medical Care, Baltimore, Md., December 5-7, 1968 and Margarette Reid's unpublished study of consumer expenditures.

** One way of viewing the role of health is to consider it as a stock variable. If a person's health is poor or deteriorates, there may be a gap between the actual and desired health status. Since health cannot be purchased directly, he will increase purchases of medical care and other goods which have an impact on health.

We would also be in a position to deal with exogenous changes in health. Not all variation in health can be associated with known factors. This will in part be due to imperfect knowledge, but there may also be a large random component. Variation in health from these sources may be nearly as important as variation which can be represented by other variables.* Omission of this component can bias the estimates of the coefficients of other variables, including income.

Once health is explicitly included as a variable in the demand for medical care, the interpretation of other variables must be modified, as illustrated for the case of income. The greater the income of a family, the greater the quantity of medical care that will be demanded at given levels of other variables. Suppose that we are examining a range of variation in which increases in income produce increases in health, perhaps because of improved diet, housing, etc. We will then tend to get lower estimates of the effect of income on the quantity of medical care than would be obtained if we compared groups with comparable levels of health. This occurs because as income increases, health improves, and better health means that less medical care will be demanded. An explicit treatment of the problem would involve estimating the effect of income on medical care holding constant health, the effect of income on health, and the effect of health on medical care holding constant income. The total effect of income is the sum of the effect of income on medical care, given health, and the effect of income on medical care operating through health. This approach would provide knowledge of the relative importance of different forces, with the effects of income, given health, corresponding more closely to the income elasticities of economic theory.**

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* For example see Richard Auster, Irving Leveson, and Deborah Sarachek, "The Production of Health, An Exploratory Study," unpublished manuscript, National Bureau of Economic Research, October, 1968.

** The demand curve for medical care omitting health might take the form, for example, of:

$$M = aY^{\alpha} O^{\beta}$$

and including health:

The problem of separating the effects of health and income is potentially quite serious if a comparison of income elasticities of different types of medical care is desired. We know that hospitalization rates vary relatively little by income size class and physicians' office visits per capita vary considerably, even when other demand variables are held constant. This may well be because the latter reduce the demand for hospital services by virtue of their impact on health.

Price Effects

In addition to the effects of a direct price, insurance can have a price effect. The greater the proportion of costs covered by insurance, the lower is the price of the service to the user, and therefore the more he will tend to use.** Empirically, insurance has been treated

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$$M = bY^{\gamma} H^{\varepsilon} O^{\theta}$$

where M is the quantity of medical care, Y is income, H is health, and O represents other variables. The income elasticity of demand is γ. Let the effect of income on health be given by

$$H = cY^{\delta}$$

The effect of a one percent change in income on medical care demand is then equal to

$$\gamma + \varepsilon\delta$$

** See Kenneth Arrow, "Uncertainty and the Welfare Economics of Medical Care," American Economic Review, 53, pp. 941-75 and M. V. Pauly, "The Economics of Moral Hazard: Comment," American Economic Review, LVIII, No. 3, Part 1 (June, 1968), pp. 531-37. The statement need only hold when health status is held constant. If increased insurance coverage is associated with a greater growth of coverage for ambulatory care than inpatient care, and if ambulatory care, by improving health, reduces the demand for inpatient care, the total demand for medical care could fall. If this model is applicable it would strengthen Arrow's case for government financing and make Pauly's criticisms of only minor importance in practice. Considering the high income elasticity of demand for physicians' office visits, if there is a diminishing effect of physicians' services on health, the possibility that comprehensive insurance coverage would reduce the demand for medical care will tend to be greatest for low-income groups.

as a single variable such as proportion of persons or expenditures covered, with no allowance for the conditions under which reimbursement is made. There are both theoretical and empirical reasons for favoring a more explicit formulation. If some expenses are deductible from the amount reimbursed, higher income will influence the probability of treatment rather than the amount spent. With the patient paying a set proportion of costs in a coinsurance scheme, insured expenses are subject to the same income effect as the out of pocket expenses with which they are used in fixed proportions. Any control of utilization of services exerted by the insurer will influence all of the expenditures including the uninsured portion. In practice there will usually be a combination of deductibles and coinsurance. Furthermore, it is necessary to consider the effects of insurance coverage of one type of care on the use of other types of care. The relative growth of hospital care has been in part attributed to its more rapid growth of coverage than ambulatory care. One can also hypothesize that the absolute growth of ambulatory care would be greater with greater insurance coverage of inpatient care, if both are viewed as parts of an entire treatment process.

The most important effect of insurance and other financing mechanisms is on the role of other variables. When there is no insurance coverage, income is the most important demand variable. When there is complete external financing, however, income and money price are irrelevant. More generally, when government payments and insurance coverage finance a large portion of costs, money price and income lose importance as determinants of demand. Attention focuses on the non-money price variables such as the value of the consumer's time in traveling, waiting, and being serviced, inconvenience and other factors. Variation in the quality of medical care for a given price is equivalent to price variation.

The efficiency of consumption approach views households as having production functions which combine goods and services with their time to produce satisfactions. More efficient households will combine a given value of goods in a way which produces greater satisfaction or requires less input to accomplish a given result. This is equivalent to paying a lower price for purchased services and to using

less time. A major component of efficiency of consumption is the role of information about prices, availability of services, means of utilizing services, etc. Increasingly, variables which have traditionally been grouped under tastes are being treated as reflecting either price or efficiency of consumption.* A particularly important example of the latter is education.

The Role of Education

Studies have shown that more educated populations tend to have better health than less educated ones, even at the same levels of income, expenditures for medical care, urbanization, and other variables.** Yet studies of the demand for medical care have disagreed on whether education increases or decreases demand.*** In order to better understand specific factors which may be responsible for better health, it is useful to consider general hypotheses which lead to particular behavior patterns.

It would seem likely that much of the impact of education on medical care demand can be traced to its effects on health. The strength of the effect of education on health and the relative unimportance of health education in the schools suggest that factors associated with general education are at least partially responsible. Education may improve the ability to learn, so that the patient

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* This approach has been developed by Becker and Lancaster, and is being tested by Michael, Grossman, and others. See Gary S. Becker, "A Theory of the Allocation of Time," Economic Journal, September, 1965; Kevin Lancaster, "A New Approach to Consumer Theory," Journal of Political Economy, April, 1966; Robert Michael, unpublished work on efficiency of consumption; and Michael Grossman, unpublished work on efficiency of consumption in health, at the National Bureau of Economic Research.

** See Victor R. Fuchs, "Some Economic Aspects of Mortality in the United States," unpublished manuscript, National Bureau of Economic Research, July, 1965, and Richard David Auster, Irving Leveson, and Deborah Sarachek, "The Production of Health: An Exploratory Study," unpublished manuscript, National Bureau of Economic Research, October, 1968.

***See Herbert Klarman, op. cit. Subsequent studies have tended to show a positive effect.

benefits more from experiences with illnesses. It may influence how well a person recognizes symptoms, seeks care, or follows a recommended treatment. It may improve his ability to communicate so that he obtains more information from the doctor, helps the doctor tailor treatment to his individual needs, or make him better understand what he is told. The more educated may have more stable incomes leading to more continuous care. Education may reflect native ability. It may also single out people with certain types of behavior who also demand more education rather than reflecting the effects of education itself; there are many possibilities.

A hypothesis about general education that I find particularly appealing is that education encourages thinking about the future. This in turn makes one receptive to an array of information about what to expect in the future and how to prepare for it. With improved understanding of the way present behavior can influence future events, relatively more activities which influence the future will be undertaken. It is analytically convenient to treat increased information as affecting the relative prices of activities which yield satisfactions (or reduce satisfactions) in different time periods.* The cost of not overeating today is the foregone enjoyment of the meal. The appropriate opportunity cost is perhaps not the loss of satisfaction of spending the money on future overeating, but the possibility of dissatisfaction caused by a heart attack which might have been avoided. The effective opportunity cost has risen to someone concerned enough about the future to consider the effects of diet on health, not because costs have changed, but because he has learned that the opportunity cost is in fact higher.

To the extent the hypothesis that education induces more behavior designed to increase satisfaction in the future, we might expect that education would increase the demand for medical care, all other things being equal. This would be most likely to hold for those types of care with a large investment component. However, an increase in

* The change in the utility of information increases the quantity obtained, but with differences in information, the relevant terms of trade between goods differ.

prevention and treatment earlier in the course of illness could of course reduce the amount of medical care ultimately demanded.

Investment vs. Consumption

Until now we have tended to implicitly view consumption of a service as taking place at the time of purchase. This is an inadequate description of a process by which the health status of an individual is constantly being modified by a series of medical and environmental experiences. We can, for example, think of a "stock" of immunities as having been built up over a person's lifetime by vaccination and by exposure to diseases. This yields a flow of protection against disease. The demand for additional vaccinations depends on the number and kinds previously acquired, just as the demand for new cars depends on the stock of used cars, their types and ages. Information can also be treated as a stock.*

Not only does the investment approach require consideration of the appropriate stock variables, it leads us into a host of investment determinants which have scarcely been considered in medical care demand. These include the availability of capital and the strength of preferences for present over future consumption. Some of the geographic aspects of the investment approach are considered in the next section.

Private vs. Social Benefits

The demand for a product or service depends on the satisfactions expected from it. The satisfactions derived from medical care depend primarily on the effect it has on health status. Different types and qualities of care will have different effects on health status in addition to different costs. In comparing alternative ways of improving health to determine which services will be demanded, even private individuals therefore implicitly consider "cost-effectiveness,"

* Recognition of the importance of stock variables suggests that we pay increasing attention to medical history data which, because much of it can only be adequately acquired on a current basis, requires early efforts to provide for the future.

although their information may be rather limited. From the point of view of demand it is the consumer's perception of quality that is relevant.

As with the case of many other forms of human capital, health is thought to have benefits beyond those to the individual receiving it. An obvious example is the control of infectious diseases which prevents contagion by other members of society. Social benefits may be very far-reaching. For example, if improving a person's health enables him to work rather than recieve Public Assistance, society would be willing to give him free medical care if such a saving were great enough in relation to the cost of medical care.

Recently, decisions to provide free medical care have not been based so much on rational calculations as on the belief that all persons are entitled to free medical care as a matter of right. When applied to too many commodities, this kind of thinking conflicts with the scarcity of resources and also ignores adverse effects of free services on work incentives. For a single commodity it must be justified not only in terms of the existence of social benefits, but also in relation to the benefits to be derived from distribution of other commodities. We could, instead, provide individuals with the same amount of money and let them spend it as they choose.

The extent to which we should provide individuals with goods (or earmarked funds) rather than money is a problem that has not yet received much attention from welfare economists. The question has been considered at highly aggregative levels.* However, with the existence of social benefits to be derived from private expenditures it would be much more appropriate to ask whether goods or money should be distributed for each commodity. Assuming that there is some socially desired level of consumption of each commodity by potential recipients, the merits of distributing goods will depend on the extent of the gap between actual and desired consumption. In the case where the value to be distributed is variable as with insurance price elasticities are relevant as well.

* For example, see L. Foldes, "A Note on Redistribution," Economica, 34 (May, 1967), pp. 203-5.

The main theoretical argument for government health insurance has rested on the empirically unverified assumption that the population as a whole has an aversion to risk and is willing to pay a premium to avoid it. The argument put forth by Kenneth Arrow* then considers the extent to which the lack of more complete private insurance represents a market failure resulting from the existence of a "moral hazard," i.e., a tendency of high risk individuals to insure first. Market failure is then given as a justification for government insurance programs.

An alternative line of reasoning might be that differences in health among income groups result from differences in levels and patterns of living and that these differences in health are a major source of differences among individuals in well-being, even beyond those differences in welfare indicated by variations in income. A society wishing to equalize the distribution of utility rather than income might therefore put a major emphasis on extending greater medical care to the poor. This view would presume that the poor do not themselves purchase the necessary quantitites of medical care because of imperfect information, inefficient consumption, high costs of capital, etc. and/or that the rest of society derives satisfaction from the well being of the disadvantaged. I suspect it is this latter line of reasoning that is more heavily inbedded in the thinking of advocates of comprehensive health insurance, a group which does not have the habit of thinking in terms of the distribution of income alone.

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* Op. cit.

THE DEMAND FOR AMBULATORY CARE

At the level of choosing a particular source of medical care over another, many variables which are of limited importance in the demand for medical care in the aggregate come to the forefront. Some considerations will be discussed in turn.

Price

While the total quantity of medical care demanded is known to be very insensitive to price, it is likely that the choice between different kinds of facilities is more greatly influenced by price considerations, and that choice between facilities of the same type is highly sensitive to price variation. This is meant in the sense of price for a given quality of care. Raising the quality of a service (as perceived by the patient) at a given money price is equivalent to some reduction in price of a service of given quality. The relevant quality variables include the hours a clinic is open, the courtesies extended and other amenities. The price effects of insurance are potentially large. Less than complete coverage may significantly influence the sources of care that are sought.

Distance is a potentially important "price" variable because there are costs of time and direct costs of travel associated with it. Travel may present particular problems for the old, the disabled, and persons with small children. Distance may also represent availability of information which we will consider separately. It can be shown that under certain assumptions each one percent increase in the size of a facility increases the average distance people travel by one-half percent. If we alternatively think in terms of a critical distance beyond which people will not use a facility, the proportion of the population using it varies in inverse proportion to the size of the facility.* This suggests that distance may be a

* For a proof of the first proposition using the Losch hexagonal model, see W. John Carr, "Notes on Areawide Hospital Planning," unpublished manuscript, October, 1966. Also see August Losch,

more important consideration in determining whether persons receive any medical care than in determining which source of care they choose.

Information

The consumer of medical care is faced with great uncertainty about the nature of his illness and the efficacy of medical care. He is faced with a choice between many alternative sources of care and treatments. In response to this need he purchases the commodity

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The Economics of Location, New Haven: Yale University Press, 1954. If c is the number of cases handled per capita and p is population density, the following identity holds:

$$a = \frac{s}{cp}$$

where a is area and s is the size of facility in terms of number of cases handled. Now if d is distance

$$a = kd^2,$$

and the area a* corresponding to the critical distance d* is

$$a^* = kd^{*2},$$

the proportion of people using the facility R is given by the ratio of the areas a* and a, under the assumption that population is uniformly distributed over the terrain. Therefore

$$R = \frac{d^{*2}}{\frac{s}{cp}}$$

Taking partial derivatives,

$$\frac{\partial R}{\partial s}\frac{s}{R} = -1 \qquad \frac{\partial R}{\partial c}\frac{c}{R} = 1 \qquad \frac{\partial R}{\partial p}\frac{p}{R} = 1.$$

Not only does an increase in size reduce utilization. Increases in the number of cases per capita given size and density means an increase in the number of facilities and a reduction of distance, which increases utilization. Similarly, increasing density with a given size of facility reduces distance which increases utilization proportionately.

information, to the extent the value he believes that information to have is at least as great as its cost. Of course, much of the information is purchased from the physician--diagnoses, drug prescriptions, referrals to other sources of care, etc. This does not, however, imply that the consumer completely relinquishes control over the consumption decision to the physician. He always has the option of not following the physician's advice. A more important choice mechanism, however, is through choice of physician. Many patients are known to shop until they find a doctor who will provide the treatment they want. A subtle method is through choice of regular physician who reflects the desires of one's socioeconomic group.*

The question of search for information about location and quality of care is considered next.

Choice Between Sources of Medical Care

A number of bodies of data have indicated that people will often travel far for medical care even when it is available in their own neighborhoods. This behavior is often explained by some general term such as "habit"--which tells us little about how many or which individuals will choose local sources of care or why they do so. Here the choice is viewed as an explicit investment decision. In this formulation the patient chooses the alternative source of medical care associated with the highest value of benefits in relation to costs. This approach yields a number of interesting and testable hypotheses.

Since mobility requires reconsideration of sources of medical care, it is hypothesized that population groups with high mobility will change sources of medical care more frequently than others. The high mobility in the population, particularly among low-income groups in large cities, should result in a constant reexamination of choices

* This point has been suggested by K. K. Ro.

and shifting between sources of medical care.* Retirement of physicians also requires locating new sources of care. If low-income people use older physicians, the more frequent retirement and death of physicians should, all other things being equal, lead them to change sources of care more frequently than persons with higher incomes.

Beyond any difference in fees or quality of care, neighborhood care involves the saving of the difference in travel fares over distant care for each visit, and the value of the saving of travel time. There may also be a saving in inconvenience of travel. The primary disadvantages of switching to a new source of care are the lack of continuity of care and the cost of information and experimentation with local facilities.

Let V represent the present discounted value of the difference between benefits and costs of changing from distant to neighborhood care. In arriving at V we use valuations determined by considering the results of several decisions made simultaneously. For example, a person will weigh greater waiting time in one facility against the value of evening hours in another, or weigh the uncomfortableness of unfamiliar neighborhoods against the costs of bus fare to another facility. We assume that it is possible to put a value on all components of V, as of course the individual does implicitly in making a decision. It is necessary to discount future costs and benefits because a dollar received in the future is not worth as much as one received today. The rate of discount depends on the strength of a person's preference for present over the future consumption and on the availability

* For example, in New York City in 1960, 35.6 percent of whites and 42.9 percent of non-whites had changed residences in the previous five years, some more than once. About three-tenths of moves were across county lines. See U.S. Bureau of the Census, Census of Population, 1960 PC(1)34D, New York, Table 100. Of course, the opening up of new sources of care and changes in the conditions of availability also induce a reassessment of alternatives.

of credit.*

Individuals will differ in their values of V. Those individuals for whom V is positive will change sources of care. For any group there will be a distribution among individuals of values of V. Figure 1 shows a cumulative frequency distribution for the same group under different conditions. The number of persons with V greater than zero, i.e., the level of the curve, depends on all of the parameters which comprise V. When a parameter changes, shifting the curve, the number of persons switching to or away from all local sources of care depends on the shape of the curve. This in turn depends on how much the value of V (or its components) differs among individuals. We can also think of the curves as applying to different groups, such as the old and the young or whites and non-whites.

Examining each component of V, <u>for a given level of each other component</u> we can form a number of hypotheses:

1. People will choose neighborhood care when it is cheaper, all other things being equal.
2. People will choose neighborhood care when they believe it is of higher quality.
3. The nearer the neighborhood facility, the less costly, the more convenient, and faster the transportation, the more people will use it.

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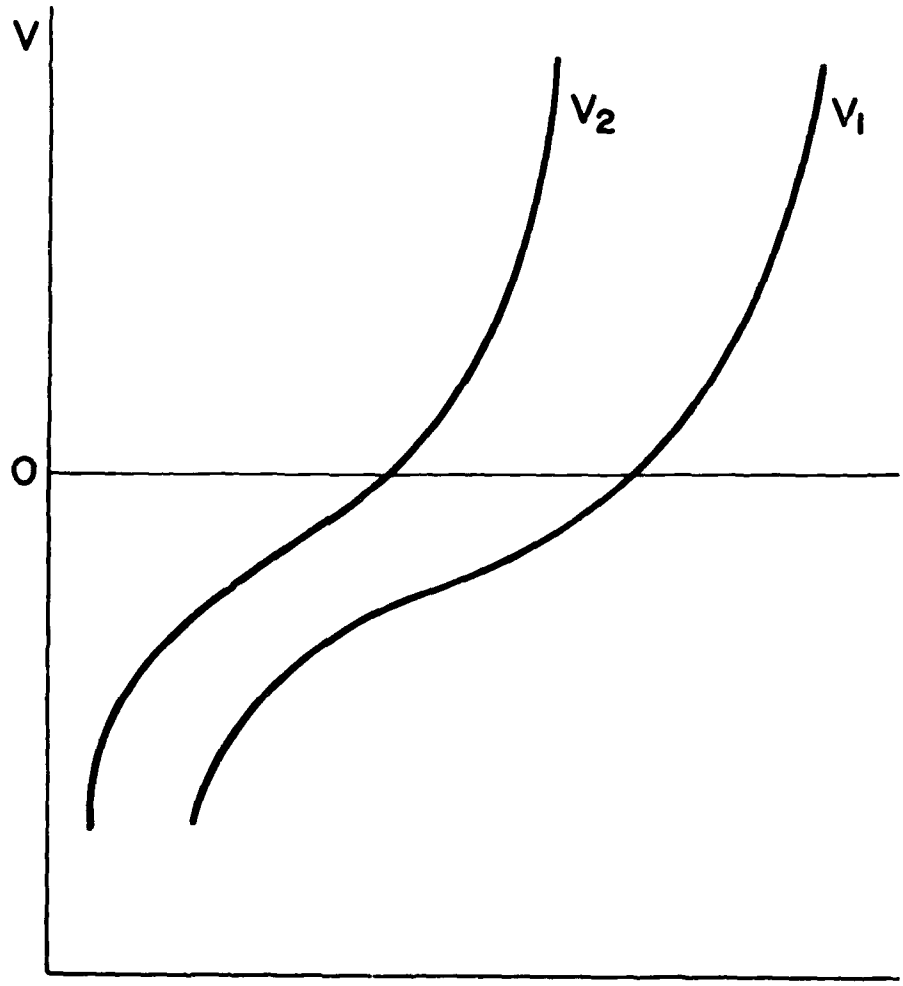
* The present discounted value of the gain from all future visits is

$$V = \sum_{j=0}^{n} \frac{g_j v_j}{(1+r)^{j+1}}$$

where n is the number of periods, v_j is the number of visits in the period, g_j is the saving of neighborhood over distant care, and r is a person's subjective discount rate indicating the extent of his preference for present over future benefits.

This formulation is similar to Becker's; see Gary S. Becker, <u>Human Capital</u>, New York: National Bureau of Economic Research, 1964, p. 38.

CUMULATIVE DISTRIBUTION OF V



Percent of persons with V below stated level

4. People will be more likely to travel to nearby areas out of their neighborhoods the less distant those areas are.
5. Those people least able to travel will choose neighborhood care.
6. People with better alternative uses of time will choose neighborhood care. The higher price of time for high income groups will tend to result in greater use of neighborhood care. However, the higher income permits use of more expensive transportation. The difference between high and low-income groups depends on the relative strengths of these effects.* **
7. Younger people receive the benefits from switching to local sources of care for a longer period, so they will choose neighborhood care more often.
8. Those people who make the most frequent visits will choose neighborhood care. For example, in large families, more persons may benefit from changing sources of care than in small families.
9. Persons who value the present more highly over the future will switch to neighborhood care less frequently after moving than others.
10. Switching will occur more often when a large amount of service is needed immediately, since discounting of the savings from changing sources of care will be less heavy.

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* See Reuben Gronau, "The Effect of Traveling Time on the Demand for Airline Transportation," unpublished manuscript, National Bureau of Economic Research, 1967.

** When goods and services are free, in the absence of transportation costs, time intensities are 100 percent. The elasticity of demand with respect to the price of time will therefore be much higher than in the usual case in which time intensities are much smaller. See Gary S. Becker, "A Theory of the Allocation of Time," Economic Journal, September, 1965.

11. More people will choose neighborhood care for the types of care in which continuity is less important (i.e., "The doctor knows me").

Up until now the costs and returns have implicitly been assumed certain, although not fully known. If instead we treat the parameters as expected values of probability distributions which indicate the chance assigned to each outcome, risk preferences and degree of risk become relevant. We can add the hypothesis that:

12. Fewer risk averters will choose local sources of care than people with similar economic and social status. For example, people who have purchased medical insurance may be less likely to switch to local sources of care after changing residences than others.

The value the patient places on quality of care depends both on his assessment of possible outcomes and also on his valuation of life and health. Quality variation is equivalent to price variation for a given expenditure of time and effort, so that higher quality will result in greater demand given the fee.

Search will take place over geographic areas. The wider the variation in quality the more search will take place and the more distant the area people will search because the greater will be the chance of finding better quality than the best already known.*

The choice between alternative types of services can be viewed in much the same way as choosing among services of different quality. Medical practice and policies will determine the services a person is likely to obtain from each source. He will then choose based on his own conception of the value of each group of services. The greater the variation among individuals in their valuation of different types of combinations of services as well as qualities, the greater will be the incentive to search more forms of medical care organization.

If the supply of services is limited, a method of rationing must be used to allocate patients. In practice this is partially done by

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* See George J. Stigler, "The Economics of Information," Journal of Political Economy, LXIX, No. 3 (June, 1961), pp. 213-225.

the medical profession according to the seriousness of each case. Much rationing also takes place in the form of queueing at medical facilities. The willingness of persons to wait depends on both the value of the patients' time and the importance attached to medical care. In addition to affecting the allocation of patients among alternative facilities, these factors may be important in determining whether patients receive any care at all or whether they receive continuous care when medical care is in short supply.

With an unlimited supply of services at a zero money price, another question arises. Much of the value of "free" benefits to patients may be dissipated in costs of time and inconvenience. The value of social costs which includes the costs of providing services and costs of time could easily exceed social benefits unless social benefits are considerably larger than the costs of providing services alone. That is, free pricing encourages higher costs in the form of search, travel, and queueing which must be compensated for by higher benefits if the social rate of return is to be positive.

ACCESS TO MEDICAL CARE: THE QUEENSBRIDGE EXPERIMENT

Little of the information required to test the hypotheses discussed is available. The estimates presented here are an improvement in information over what has typically been available and are suggestive as to the relative strengths of various forces that it has been possible to measure.

Offering services with improved accessibility is an important component of policies designed to extend medical care to low-income groups. However, the availability of services does not necessarily mean that they will be used, even if properly tailored to the needs of the community. A great many factors, discussed earlier, may come into play. Information about the determinants of demand for medical care in facilities will help in predicting utilization and identifying needs and hopefully also in devising ways to encourage utilization. Here we concentrate on the primary aspect of utilization -- whether or not services are used at all.

One of the methods of organizing medical care, which has great potential for reaching the community and economizing on costly inpatient and nursing home care, is the provision of services in clinics established in housing projects for the elderly. One such unit, established with the points in mind is the Queensbridge Health Maintenance Service (QHMS), which was set up in November of 1961 by the New York City Departments of Health, Hospitals, Welfare, and other agencies. The unit offered a variety of services, including home care without charge to the 1,400 residents of the Queensbridge Housing Project in Long Island City, New York. Extensive efforts were made to inform residents of the on site availability of services which previously required travel of four miles or more. An evaluation of the project has been conducted by Kuo et al.* Here an analysis of

* Nicetas H. Kuo et al., "The Queensbridge Health Maintenance Service for the Elderly, An Evaluation," unpublished manuscript, New York City Department of Health, n.d.

the determinants of whether or not persons registered for the service is conducted. Particular attention is paid to the role of health status in the demand for medical care, to separating the effects of income and education in disaggregated data, and to non-money "price" and information variables.

The Data and Methods

The sample consists of the 1,219 of the approximately 1,400 residents of the Queensbridge Housing Project for whom information had been obtained between January 1963 and the Fall of 1964. Only persons age 60 and over are included since use of the clinic was limited to that age group. Of the total, 638 had registered (participants) with the QHMS and 581 had not. As a means of separating the effects of health status from other variables, a subsample of 343 persons who reported that they had heart conditions is examined. The group of heart patients is of particular interest in view of the emphasis of the Regional Medical Prog ms* and is large enough to make statistical analysis meaningful. Among the heart group, 201 persons participated and 142 did not. Information on nonregistrants was collected at various dates at the QHMS. The initial groups were interviewed at the time of registration. It is therefore possible that the information obtained is differently influenced by degree of satisfaction with the clinic or knowledge gained about one's health.

Variation in the percentage of persons participating in the clinic across socioeconomic groups is examined. In simple one-way classifications, for both the total and heart groups, we try to refute the null hypotheses that the percentage participating does not vary among socioeconomic groups by chi-square "goodness of fit" tests. Specific hypotheses concerning the variables examined are introduced at that time and the effect of the control for health status is considered for each variable.

* The President's Commission on Heart, Cancer and Stroke, A National Program to Conquer Heart Disease, Cancer and Stroke, Washington: 1964.

A multivariate analysis of the heart group is then performed using the dummy variable multiple regression technique. All variables take on values of zero or one. For example, the dependent variable is coded 1 for participants and zero for nonparticipants. For variables which cannot appropriately be dichotomized, a series of dummy variables replaces a single variable. Each variable in the set represents a class interval of the continuous form, and observations are coded 1 or 0 depending on whether or not the value of the variable falls in a given interval.* One variable is omitted from each set of dummies and becomes the base. The regression coefficient for any other dummy in the set then indicates by how much each class interval of the independent variable differs from the base group in its value of the dependent variable.**

The chief disadvantage of the dummy variable technique is that it does not conform with the assumption of homogeneity of variance of the regression model. This still enables estimation of unbiased regression coefficients when other regression problems are absent, but casts doubt on the validity of the usual tests of statistical significance. For this reason, the analysis utilizes a chi-square test of the significance of sets of dummy variables which depends only on the regression coefficients and not on the distribution of the regression residuals.*** As in the one-way chi-square test, the "expected" values are the numbers of participants and nonparticipants that would be observed in each class interval of the independent

* See J. Johnston, Econometric Methods, New York: McGraw-Hill Book Company, Inc., 1963, and Arthur S. Goldberger, Topics in Regression Analysis, New York: The Macmillan Company, 1968.

** Daniel B. Suits, "Use of Dummy Variables in Regression Equations," Journal of The American Statistical Association, 52 (1957), pp. 548-51.

*** The standard test would be an F test to see if the increase in explained variance when a set of dummy variables is added is significant in comparison with the unexplained variance. See Emanuel Melichar, "Least Squares Analysis of Economic Survey Data," Proceedings of the Business and Economic Statistics Section of the American Statistical Association, 1965, pp. 373-85.

variable if the average percentage participated in each class interval. Instead of comparing these with true actual values, however, pseudo-actual values are derived from the set of regression coefficients for a variable. These differ from the actual values in that other variables are held constant.* It should be noted that in the cases in which the chi-square test was compared with the F test, nearly the same levels of significance were indicated.

The dummy variable technique has certain advantages over use of continuous forms. While it is especially suited to analysis of survey data, its use for this purpose has been extremely limited. Some of these advantages are great enough so that it would pay at times to create sets of dummy variables from continuous forms. For these reasons it is worth stating the advantages clearly. There is no need to make an assumption of linearity, and it is easy to fit functions which are nonmonotonic. By cross-classifying variables, tests for interaction can easily be made without the usual problems of high multicolinearity. Since all observations are used, it is possible to avoid many of the limitations of cross-classification. In effect, small sample rows and columns are pooled on the assumption that the effects of variables are additive except where specific interaction terms are introduced. Another advantage is the ability to retain information for persons with unknown values of certain variables but known values of others, by including an "unknown" category in the set of dummies. Since survey data often come in class intervals, measurement error associated with a choice of midpoints is avoided.**

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* The calculation of the pseudo-actual number of participants and non-participants can be illustrated for the income variable. First the set of regression coefficients for each income class interval which is in terms of deviations from the omitted class interval is converted into a deviation from the mean and the mean added. This provides a "percentage participants" at given levels of other variables for each income class. This percentage is multiplied by the number of persons in the class interval to obtain the pseudo-actual number of participants and non-participants in the class interval.

** Also, since errors in the data may be concentrated at certain values of a variable, this will show up as a high standard error for that coefficient, so that it may be possible to reject one or more coefficients without losing information on the remaining set of dummies or obtaining a biased coefficient for the entire variable.

The Results

Table 1 shows the percentage participating by level of each variable, for all residents and for those reporting heart trouble. Table 2 indicates the levels of statistical significance in the test of whether the percentages differ from equality among levels of any variable. The percentage participating is slightly higher in the heart population than for all residents, 58.6 percent compared to 52.3. This is expected since a group known to have any given health problem will tend to have poorer health than the overall population, some of whom have no health problem, and because the existence of a health problem contributes to the decision to seek medical care. Similarly, among the total population, older persons are more likely to be participants because they will tend to have more health problems. However, among the heart group, age is not significant. This may be because aging does not produce a worsening of heart problems which requires more medical care, the care is not sought, or when conditions become more serious it is sought in places other than the clinic. Another way of looking at the effect of presence of a heart condition is to note that younger persons with heart conditions are more likely to use the clinic than others, but at older ages where a greater percentage of persons will have health problems requiring medical attention, the two groups participate about equally. A further indication of the role of health status is given by self-rating of health, which similarly to age, is highly significant for the total population but not significant for the heart population. Sex differences are small and not statistically significant.

The data for the total population showed greater participation for whites even though non-whites might be less able to afford alternative sources of care, and a substantial proportion of the clinic personnel were non-white. It was hypothesized that this too could be attributed to health status, since non-whites surviving to age sixty or more would have to be hardier relative to their initial cohort than whites who are likely to have had more medical care when needed and a better environment. Surviving non-whites would tend to

Table 1

PERCENTAGE OF RESIDENTS PARTICIPATING IN THE QUEENSBRIDGE HEALTH MAINTENANCE SERVICE, TOTAL AND HEART POPULATIONS, BY SELECTED CHARACTERISTICS

Characteristic	Total Population	Heart Population
Total	52.3%	58.6%
Age		
60-64	41.4	55.0
65-74	51.6	60.1
75-84	61.2	60.0
85-99 or n.k.	43.5	46.7
Self-Rating of Health		
Excellent or Good	44.8	63.3
Fair or n.k.	52.8	51.9
Poor or Very Poor	62.3	62.7
Sex		
Female	52.2	58.1
Male	52.6	60.0
Color		
Non-white	44.8	57.3
White	54.5	59.0
Mobility Level		
city or n.k.	46.3	57.8
Neighborhood	66.7	63.0
Project	67.8	68.8
Apartment	54.8	46.3
Non-ambulatory	66.7	50.0
Travel Time		
Less than one hour or n.k.	51.1	57.7
One hour or more	57.4	61.8
Health Insurance		
None or n.k.	54.8	59.0
Hospital or Doctor Bills	56.4	59.5
Hospital and Doctor Bills	32.4	47.1

Table 1 (cont'd.)

PERCENTAGE OF RESIDENTS PARTICIPATING IN THE QUEENSBRIDGE HEALTH MAINTENANCE SERVICE, TOTAL AND HEART POPULATIONS, BY SELECTED CHARACTERISTICS

Characteristic	Total Population	Heart Population
Usual Source of Care		
No place or n.k.	39.4%	42.8%
Elmhurst hospital	73.1	79.0
Other municipal Hospital	71.2	63.6
Voluntary hospital	59.4	60.0
Other	44.7	87.5
Income		
Less than $999 or none	58.4	67.4
$1,000-1,999	66.7	71.9
$2,000-2,999	44.6	43.8
$3,000-3,999	31.1	33.3
$4,000 or more	24.0	37.5
n.k. or refused	14.8	15.2
Marital Status		
Other than married	53.6	59.6
Married	50.3	56.8
Number of People in Households		
1 or n.k.	53.5	60.9
2	51.2	57.0
3 or more	48.3	48.0
Education		
None or n.k.	57.0	58.6
1-5 years	48.5	54.5
6-8 years	52.4	64.5
9-10 years	52.2	57.5
11 years or more	52.2	58.1
Employment Status		
Other or n.k.	61.6	64.6
Working	20.7	31.2
Housekeeping	47.7	52.7

Table 1 (concl.)

PERCENTAGE OF RESIDENTS PARTICIPATING IN THE QUEENSBRIDGE HEALTH MAINTENANCE SERVICE, TOTAL AND HEART POPULATIONS, BY SELECTED CHARACTERISTICS

Characteristic	Total Population	Heart Population
Length of Residence		
Less than 5 months or n.k.	85.8	89.2
6-23 months	53.3	53.4
24 months or more	48.1	55.0
Foreign Born		
U.S.A. or n.k.	44.7	50.7
Foreign Born	57.9	64.8
Religion		
Other or n.k.	47.3	54.4
Catholic	49.3	50.0
Jewish	65.7	75.8

Note: n.k. means not known.

Table 2

LEVELS OF SIGNIFICANCE IN CHI-SQUARE TESTS OF QUEENSBRIDGE PARTICIPATION WHERE LEVEL IS 90 PER CENT OR MORE

Variable	Single Variable: Total Population	Single Variable: Heart Population	Multivariate: Heart, Population
Age	99%	--	--
Self-rating of health	99%	--	--
Sex	--	--	--
Color	90%	--	--
Mobility level	99%	--	--
Travel time	--	--	--
Health insurance	99%	--	--
Usual source of care	99%	99%	99%
Income	99%	99%	99%
Marital status	--	--	--
Number of people in household	--	--	--
Education	--	--	99%
Employment status	99%	90%	90%
Length of residence in Queensbridge	95%	99%	99%
Foreign born	99%	90%	--
Religion	99%	99%	95%

Source: Tables 1 and 3.

have fewer health problems and, if this were the case, the color difference would not appear among the heart group. In fact, the color difference is very much smaller for the heart group and is not statistically significant.

Not all effects of health status are to increase the demand for medical care. Mobility limitations clearly reduced participation even though home visits could have been arranged. Again the effect of health status can be associated with the presence of a disabling condition since within the heart group mobility was not significant. Mobility status can be considered a kind of a price variable, indicative of the amount of inconvenience or discomfort of getting about, or of the costs that would have to be incurred to avoid that discomfort. Another "price" variable which was included in the analysis is travel time to the person's usual source of care prior to clinic registration. Participation was greater among persons having to travel an hour or more in both groups. However, differences were not statistically significant, perhaps because the variable is poorly measured. There is some indication in the results that health insurance coverage leads to greater use of alternative sources of care, as its effect on relative prices would suggest. To some extent, both health status and price effects probably account for the large differences in participation of persons classified according to the usual source of medical care prior to the availability of the clinic. It is disturbing that over one-third of the population and over one-fourth of the heart group both did not participate and did not report any prior usual source of care. Surprisingly, these persons did not differ materially from non-participants with regular sources of care or from participants with respect to either mobility level or self rating of health.

It was hypothesized that the higher the income of a person, the better he could afford to purchase medical care from alternative sources if he believed it necessary, more appropriate, of higher quality or otherwise desirable. Since much of the income for the aged represents pension payments, we probably have a measure of lifetime as well as current income. Income turns out to be a very

powerful variable for both the total and heart groups.

It was possible to test the effects of several variables reflecting various aspects of the availability of information to the project residents. Both marital status and number of people in the household were intended to reflect the number of instances a person heard about the clinic, while marital status might also have operated through concern for the health of one's mate. However, neither was significant. Employment status, on the other hand, intended to reflect the awareness of alternatives, and willingness and ability to operate in the outside community did prove important. However, this may also reflect good health and less need for medical care. Both length of residence in the project and whether foreign born, intended to reflect knowledge of alternative sources of care, were statistically significant.

It was expected that persons with more formal education would be more likely to participate because of greater concern for the future, receptiveness to information, and other factors of the kind discussed earlier. It was not found significant in the univariate tests. The dummy variable multiple regression analysis of the heart group generally produces results which closely mirror those already presented. One important change was expected, however, which did materialize. Education and income tend to be highly positively correlated with each other, so that education would tend to reflect the effects of income. A zero effect of education could be produced as the resultant of a negative effect of income on participation and a positive effect of education. Table 3 presents the regression results, and the levels of significance are given in the last column of Table 2. The adjusted regression coefficients, calculated by a method given by Melichar,* indicate the deviation of percent participating in each group from the overall mean. When income and other variables are held constant, education is seen to have a large positive effect on participation which is statistically significant.

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* Op. cit.

Table 3

MULTIPLE REGRESSION ANALYSIS OF HEART POPULATION

Variable	Regression Coefficient times 100	t Value	Regression Coefficient Adjusted to Deviation from Mean
Age			
60-64	--	--	-.13
65-74	1.62	.23	1.49
75-84	-2.22	-.29	-2.35
85-99 or n.k.	.91	.07	.79
Self-Rating of Health			
Excellent or Good	--	--	6.22
Fair or n.k.	-8.01	-.60	-2.80
Poor or Very Poor	-3.14	-.22	-3.89
Sex			
Female	--	--	2.84
Male	-10.83	-1.56	-7.99
Color			
Non-white	--	--	4.74
White	-6.24	-.87	-1.49
Mobility Level			
City or n.k.	--	--	1.17
Neighborhood	-4.23	-.57	-3.06
Project	8.31	1.16	9.48
Apartment	-12.33	-1.56	-11.17
Non-ambulatory	-26.27	-1.18	-25.10
Travel Time			
Less than one hour or n.k.	--	--	1.30
One hour or more	-6.10	-1.04	-4.80
Health Insurance			
None or n.k.	--	--	1.47
Hospital or Doctor Bills	4.50	.57	5.96
Hospital & Doctor Bills	-10.47	-1.24	-900
Usual Source of Care			
No place or n.k.	--	--	-12.25
Elmhurst hospital	28.94	5.07	16.69
Other municipal hospital	5.59	.56	-6.66
Voluntary hospital	12.00	1.54	-.25
Other	37.58	2.37	25.33

Table 3 (cont'd)

MULTIPLE REGRESSION ANALYSIS OF HEART POPULATION

Variable	Regression Coefficient times 100	t Value	Regression Coefficient Adjusted to Deviation from Mean
Income			
Less than $999 or none	--	--	2.45
$1,000-1,999	11.56	1.89	14.00
$2,000-2,999	-18.71	-1.85	-16.26
$3,000-3,999	-9.45	-.59	-7.00
$4,000 or more	-13.55	-.77	-11.10
n.k. or refused	-39.47	-4.80	-37.02
Marital Status			
Other than married	--	--	-1.28
Married	3.73	.43	2.45
Number of People in Household			
1 or n.k.	--	--	-2.19
2	4.61	.55	2.43
3 or more	7.75	.71	5.56
Education			
None or n.k.	--	--	-6.99
1-5 years	1.06	.15	-5.93
6-8 years	14.80	1.93	7.81
9-10 years	10.69	1.12	3.70
11 years or more	15.00	1.51	8.02
Employment Status			
Other or n.k.	--	--	7.11
Working	-22.61	-1.80	-15.50
Housekeeping	-16.09	-2.86	-8.99
Length of Residence			
Less than 5 months or n.k.	--	--	34.18
6-23 months	-38.44	-3.50	-4.26
24 months or more	-38.30	-4.89	-4.12
Foreign Born			
U.S.A. or n.k.	--	--	-3.26
Foreign Born	5.79	.98	2.53

Table 3 (concl.)

MULTIPLE REGRESSION ANALYSIS OF HEART POPULATION

Variable	Regression Coefficient times 100	t Value	Regression Coefficient Adjusted to Deviation from Mean
Religion			
Other or n.k.	--	--	-3.87
Catholic	-4.21	-.66	-8.08
Jewish	19.95	2.64	16.08

Note: n.k. means not known.

In summary, there is evidence that health status is a major determinant of whether people seek medical care. Differences in care can be discerned even when the patient himself provides broad diagnostic information. Furthermore, the tests suggest that important variation in medical care sought can be isolated by simply classifying persons as to the presence or absence of a condition, without information on its severity. The success of crude self-classification may be that such a concept influences the patient's attitudes which are relevant for behavior, though one's own evaluation may not be as well related to functional status as a physician's classification. Income appears to be a powerful determinant of patterns of care. The effects of price variables differ greatly in their impact but as a whole seem to contribute substantially to the observed variation in use and sources of medical care. Most notably, the more educated and recent residents of the area appear more likely to use clinic services. When other variables were held constant, color was not important. Finally, Jewish residents were more likely to use the clinic.

COMPARISONS WITH OTHER EVIDENCE

Some additional data have come to my attention which permit further examination of the role of information. Efforts were made to encourage utilization of the newly established Bedford Health Center in the Bedford section of Brooklyn, New York.* Some health aides were sent around to residences to inform persons of the availability of free services at the general medical clinic, at various dates during the period. Eligibility for the services was restricted to those residing in four health areas, and within those areas, aides were instructed to "knock on every door." The aides conducted a lengthy interview to determine needs for a broad range of social services and make necessary referrals, so that the information about the clinic would not have been foremost in the minds of many residents. This would presumably lead to lower estimates of the effects of health information than if counselling were more limited. Complete information on the impact of the counselling was not available, and only two of the four areas had enough data for adequate testing.**

Table 4 shows the mean number of admissions per week for the three health areas in which there was counselling, before, during, and after the period in which counselling took place. In only one case was data for the period after counselling available and even then they only covered two weeks. To allow for a lag between counselling and admission the mean is also computed for the period during which counselling took place, excluding the first two weeks. In health areas 20 and 21 combined, admissions per week were one-third higher in the period after the first two weeks of interviewing than before interviewing began. This counselling would, therefore, increase the total patient load at the clinic by about 2-1/2 percent, assuming that the admission rate fell back to earlier levels after interviewing terminated. The counselling covered an area with about 40 percent of the households in the four health areas.

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* This area is one of the worst urban poverty areas in the United States.

** The imposition of fees after the period analyzed would have made interpretation of subsequent data impossible.

Table 4

MEAN NUMBER OF ADMISSIONS PER WEEK,
PERIODS BEFORE, DURING AND AFTER COUNSELLING
BEDFORD HEALTH CENTER GENERAL MEDICAL CLINIC

	Health Area					
	20		21		28	
Period	No. of Weeks	Admissions per Week	No. of Weeks	Admissions per Week	No. of Weeks	Admissions per Week
Before	13	14.8	18	6.7	15	10.3
During	13	16.4	12	10.4	4	7.8*
During, excluding first two weeks	11	17.2	10	11.4	2	10.0*
After	2	10.0	n.a.	n.a.	n.a.	n.a.

* Interviewing not complete

n.a. -- not available

Table 5

TESTS OF SIGNIFICANCE OF DIFFERENCES BETWEEN MEAN ADMISSIONS PER WEEK, BEFORE, DURING, AND AFTER COUNSELLING
BEDFORD HEALTH CENTER GENERAL MEDICAL CLINIC

	Health Area					
	20		21		28	
Difference Between	Difference	t	Difference	t	Difference	t
During and Before	1.6	1.05	3.7	2.89	-2.5	-1.28
During, excluding first two weeks and before	2.4	1.52	4.7	3.67	-.3	-.11
After and Before	-4.8	-1.86	--	--	--	--
After and During	-6.4	-1.90	--	--	--	--

I know of few studies for which suitable comparisons with the present research can be made. Two recent studies of younger populations in different institutional settings are of interest. One is the portion of the Yale Ambulatory Care Studies which pertains to emergency room use which was recently published by Weinerman, et al. The other is a just published study of utilization of prenatal clinics and the Judson Health Center in New York City conducted by Morton Silver as part of the Gouverneur Economic Research Project.* Both studies were analytical rather than descriptive, formulating hypotheses in advance, and subjecting them to multivariate analysis.

The Weinerman group examined variation in the percentage of emergency room visits in the Yale-New Haven Medical Center which were classified as non-urgent by physicians. This can be taken as a measure of the demand for clinic services. Over 2,000 visits were analyzed. Because users of a specific institution rather than a complete population were studied, there is uncertainty as to what extent non-users receive better care or no care at all. Age, a measure of health status, was found to be quite important, as were measures of health status in the present study. In the Yale study it reflected the greater need of the youngest and oldest groups for true emergency care. Negroes were found to have a greater percent of visits non-urgent, perhaps because of poorer health. While lower income groups tended to have a higher percent non-urgent, the difference was only weakly statistically significant. However, no result for income is given with education held constant. It may be for this reason that educational differences are not important. A number of information variables were found to be significant. Persons with a short length of residence at their current address, self-

* E. Richard Weinerman, Robert S. Ratner, Anthony Robbins, and Marvin A. Lavenhar, "Determinants of Use of Hospital Emergency Services," American Journal of Public Health, 56, No. 7 (July, 1966), pp. 1037-56, and Morton Silver, Utilization of a Neighborhood Health Center: An Economic Model of Demand for Services Available at the Judson Health Center, New York: Gouverneur Economic Research Project, 1968.

referred persons, and persons without a regular physician were more likely to use the emergency rooms for non-urgent problems. There were no significant effects of sex or religion. Zborowski found that "the Jew tends to manifest a future oriented anxiety as to the symptomatic and general meaning of pain experience."* Therefore it is not surprising that Jewish persons were more likely to use a health maintenance clinic than an emergency room, relative to persons of other faiths.

Morton Silver investigated the determinants of number of prenatal care visits and month of first visit for a sample of 142 women using seven prenatal clinics in low-income areas of New York City. Regressions with number of first visits as dependent variables were run with and without holding constant month of first visit. Two variables which can be interpreted as measures of (actual or expected) health status -- gestation period and unsuccessful outcome of prior pregnancies, were very important. An income measure was not available and education, which was associated with fewer visits and a later month of first visit, may reflect income. Education was associated with fewer visits, probably reflecting use of other sources. When the dependent variable was month of first visit anywhere, education was positive but not significant against number of visits and was not significantly related to month of first visit. Whether or not a woman had children, a "price" variable reflecting the difficulty of making a visit, adversely affected care. Travel time had the expected sign but was only significant in separate regressions for women without children. Whether or not a woman was working, in part interpreted as reflecting information and awareness about the importance of care, was associated with greater demand for prenatal care.

The Silver study provides additional information on amount of use which merits further attention. It is possible to crudely estimate the relative importance of medical care at early stages and frequent care, given the stage of the condition, in accounting for the effects of each variable.** The main effects of education (or income)

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* Mark Zborowski, "Cultural Components in Responses to Pain," Journal of Social Issues, VIII, No. 4 (1952), p. 23.

** Let the stage in the episode at which medical care is sought be

and employment status are through the frequency of visit, while the outcome of prior pregnancies and the presence of children operate relatively more through month of first visit.

Silver also examined visits of 125 children age one to five to the Judson Health Center on the lower East side of New York City. Once again an income variable was not available and the relationship of parents' education to the number of visits per child was negative. The relationships of education to the number of ill child visits and the number of illnesses were also negative, but against well child visits education was not significant. Silver notes that the classification of visits was not clear cut, depending, for example, on whether the illness was discovered during a check up. This raises the possibility that the more educated mothers more often recognized illnesses or communicated information about them. This would result in an understatement of the effect of education on ill child visits. Length of residence again was important. The foreign born tended to have significantly fewer well child visits. The new residents of the area tended to have more ill child visits.

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determined by a linear function such as the following:

$$S = a_{10} + b_{11}X_1 + b_{12}X_2 + b_{13}X_3$$

The number of treatments depends on a number of factors including stage of first treatment.

$$N = a_{20}+b_{21}X_1 + b_{22}X_2 + b_{24}X_4 + b_sS.$$

Solving,

$$N = a_{20}+b_sa_{10} + (b_{21} + b_sb_{11})X_1 + (b_{22} + b_sb_{12})\ X_2 + b_sb_{13}X_3 + b_{24}X_4$$

The proportion of the effect of a variable operating through stage of episode can be estimated by terms such as $\frac{b_sb_{11}}{b_{21} + b_sb_{11}}$

The additional information cited, either directly or with some reinterpretation, can be considered to be very consistent with the Queensbridge data.

It appears on the whole that there can be substantial social and economic barriers to the receipt of ambulatory care even when it is provided without charge at a convenient location. If society wishes to extend minimal medical care to the poor, there will have to be analyses of the alternative programs available to ameliorate or compensate for these barriers, in order to determine the costs and effectiveness of each. Programs of health services for the poor will increasingly be judged by how well they reach persons with health problems. This may be an important step in closing the gap between the distribution of income and the distribution of utility.