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The Demand for Primary Health Care Services in Low Income Countries: A Review & Case Study

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PREFACE

Over the past few years, our multidisciplinary research group at the Carolina Population Center (CPC) has been integrating social science and biological methodologies for the analysis of health, nutrition, and population issues. Focusing on the household and community levels, we have tried to gain understanding of the problems and constraints individuals and households face in attempting to meet their health and nutrition needs. A primary emphasis has been on developing methodologies for analyzing the patterns and determinants of various types of health-related behavior (e.g., breast-feeding).

In the process of analyzing research issues related to maternal and infant nutrition and feeding, we began to investigate the patterns of primary health care (PHC) use and their determinants. We realized that little attention had been paid to comprehensive analyses of PHC patterns and their determinants. Given our focus on these issues and some related experience and interest in the financing of public services, we began to discuss the possibilities of such research with several colleagues at the World Bank and the Agency for International Development (AID). A positive response led to a long period of grant seeking which resulted in this project's being funded by the Program and Policy Coordination Division of AID, under the sponsorship of Maureen Lewis. David Dunlop and Terri Lucas, both in AID's Office of Health at that time, provided valuable assistance. Additional support came from the Carolina Population Center (CPC) for a survey in the Philippines in 1981.

Advice has come from various people, but this draft represents largely the views of the co-authors, and of Dr. Sheila Cosminsky, Professor of

Anthropology at Rutgers University. Her extensive and comprehensive comments are cited throughout the patterns and determinants sections of the text. The scope and quality of this manuscript have been significantly enhanced by her contributions. Maureen Lewis also read an earlier version and made extensive comments which have materially improved chapters 1-3. CPC editor, Lynn Igoe, has also played a major role, not only in editing this manuscript, but also in seeing it through all stages of production including typing, proofing, and printing. Mary Boyer and Sharon Pigott typed cheerfully and well.

We wish to thank all of the above individuals, in particular Sheila Cosminsky, Lynn Igoe, and Maureen Lewis for not only bringing this project to fruition, but also for assisting us in initiating a line of research which we expect to continue and to integrate with our related interests.

SUMMARY AND FINDINGS

This analysis attempts to answer questions about the financing of primary health care services in low income countries, the effectiveness of these services in reaching the rural poor, the importance of economic variables in health care decisions, and the effects of individual characteristics on the choice of medical practitioner. The analysis is structured along the lines of an economic demand model, in which the choice of practitioner is determined by relative prices, income, and other individual characteristics.

We first provide evidence on the current patterns of medical care consumption in low income countries. Investigations generally indicate that sick individuals mix traditional, public modern, and private modern practitioners with little prejudice as they attempt to find a cure. The evidence also suggests that pharmacies are an important source of informal curative care, and that traditional midwives continue to be the practitioner of choice for prenatal, delivery, and postpartum care for the majority of rural women in low income countries.

We also discuss the determinants of medical care consumption, focusing on the cash, transportation, drug, and time costs that are involved. The economic literature on the demand for medical services is reviewed, leading to the specification and estimation (using rural Filipino data) of demand models for adult outpatient, child outpatient, prenatal, delivery, well-baby, and infant immunization care.

The results of our case study include the following:

1. The costs associated with medical care consumption are not important predictors of where treatment is sought. For each of the six types of services enumerated above, consumers show little sensitivity to either

the cash costs or the time costs involved.

2. For outpatient care, the seriousness of the illness is the most important predictor of where care is sought. Seriously ill patients prefer to use private modern doctors. These seriously ill patients tend to come from the poorer 40 percent of the sample.

3. For prenatal, delivery, well-baby care, and infant immunizations, the important explanatory variables appear to be the mother's education, urban residence, and a measure of the mother's time constraints.

These results lead to some important conclusions, several of which are briefly summarized below:

1. User fees appear to be a feasible method for financing governmental outpatient facilities. The threshold above which costs would affect consumption behavior is apparently quite high.

2. Policies which attempt to reach poor rural residents by providing free rural clinics do not achieve their goals, at least not for our sample. The poorer patients tend to use private doctors, traditional midwives, or no care at all. In particular, public prenatal and delivery services are much more likely to be used by the wealthier 40 percent of the households in our sample. Efforts to reach the rural poor apparently will have to be much more aggressive than such policies as simply placing clinics in poor areas.

3. The preoccupation of health planners with the cash costs of medical care to the patient is not shared by the patient. Clients are apparently far more concerned with quality than with costs.

The upshot of the analysis is that the financing of rural health projects might be far easier than the strait jacket of providing free care has allowed. While patients, including poor patients, might be quite willing to pay for

some types of care, however, the goal of policy makers to provide better care to the rural poor might be far more difficult to accomplish than is currently believed.

Chapter 1. INTRODUCTION

The primary health care movement is an international effort to expand and redirect health service programs in low income countries. The goal is to make substantial, inexpensive, and rather speedy improvements in the delivery of curative and preventive health services at the local level, particularly in rural areas. The WHO/UNICEF International Conference on Primary Health Care (WHO/UNICEF, 1978) defined the primary health program to include at least the following:

- education concerning health problems and methods to control and prevent them
- maternal and child health care including family planning
- immunization against the major infectious diseases
- prevention and control of locally endemic diseases
- appropriate treatment of common diseases and injuries
- provision of essential drugs
- promotion of food supply and proper nutrition
- adequate supply of safe water and basic sanitation.

It is striking that as general as this agenda appears to be, all but possibly the last two items require the delivery of health care services at the household level. This suggests that the success of primary health care programs

depends on their ability to satisfy individual preferences and to overcome the economic constraints that affect household decisions.

Yet, in designing rural health care systems, planners in the past have relied heavily on aggregative morbidity, mortality and fertility statistics along with information on urban, hospital-generated use and expenditure patterns (Gershenberg and Haskell, 1972; Golladay, 1980). Usually these planners have concentrated on the simple geographic distribution of health services and the associated supply and training of personnel (Smith, 1975). The choice of services offered by rural clinics has been determined largely by health professionals' evaluations of the physiological needs of the service area with few, if any, references to existing patterns of medical care consumption (Zschock, 1979). Similarly, evaluation of operating health centers has been limited almost exclusively to investigations of the work load and time allocation patterns of the staffs (John Hopkins University, 1976).

Because this planning approach pays heed almost exclusively to the physical aspects of health, it does not take into account the behavioral aspects of medical care consumption. The unsurprising result is that as badly as rural health services are apparently needed, they are often underused and difficult to finance. If government health investments in primary care facilities are to have the desired outcomes, then an effort to take into account the habits and tastes of the potential users of the services is essential.

A number of utilization issues have not been adequately addressed but can be explored using microeconomic theory and household-generated data. Among them are pricing practices, financing, income and distribution, and knowledge and other factors.

PRICING PRACTICES

In general, medical care is subsidized extensively in both high and low income countries. This subsidization pattern is based partially on the judgment that health care is a political right and that, at least in some respects, individual good health benefits the entire community (health is a public good). But it also implies the assumption that the demand for modern public health services is extremely sensitive to the cash price. In other words, there is the underlying supposition that public health services would rarely be used if user charges were more than nominal. It is not self-evident, however, that this assumption is true or that making modern public health care free is the best approach to satisfying the normative positions that health care is a right and should be treated as a public good. The reasons for doubting the wisdom of providing free (or very inexpensive) services for all include the following:

1. People often do face a cash price for medical service use, but even if it is low or nonexistent, they must still confront the possibility of cash outlays for transportation, medicines, and lodging away from home. In addition, patients are deterred from using health services by non-pecuniary costs, such as time required to get to the clinic, time consumed in waiting to see a practitioner, hours lost from work or home duties, and the incompatibility of clinic practices with local customs. To single out the cash price of the service and reduce it to zero is to assume that it is the one element in this list of costs that would prevent people from using a public clinic. To determine whether this approach is correct requires an analysis of the reaction of potential clients to <u>all</u> of these costs of the various types of health

services from which they can choose.

2. People who are ill can usually choose among self-treatment, traditional care, modern private care, and modern public care in searching for a cure. Making the public clinic relatively inexpensive (in cash terms) creates, whether by default or by plan, a self-selected target group singled out for special treatment at public expense. For example, the client group for low-priced clinics probably includes those who have ready access to the clinic as well as those with an aversion to cash costs and few other demands on their time (Acton, 1975a). Moreover, because the perception of medical need is idiosyncratic, the group served may not be very ill by objective standards. This is not a trivial problem; in many countries rural health units have developed a clientele quite different from what was intended. Government health workers have typically found themselves spending a large percentage of their time delivering curative care for minor adult grievances, leaving relatively little time for maternal and child services, preventive care, community sanitation projects, or health and nutrition education programs (Spruyt et al., 1967). For example, in Afghanistan, where more than a third of the children die before the age of five and where women and children account for 75 percent of the rural population, the basic health centers initially served a predominantly adult male clientele offering only minor complaints (O'Connor, 1980).

Economic analysis can ascertain who is being reached by public clinics and what actions might be taken to change the group served. The desired distribution of patients among individual clinic services (immunization, prenatal, obstetrical, curative) can be approximated by careful manipulation of the prices charged.

FINANCING

Direct cash costs, indirect cash costs (drugs and transportation), and nonpecuniary costs (time) of consuming public health services can all be affected by government policy. In most cases, because direct costs to the patient have been kept low, primary public health facilities have been financed almost exclusively from public sources: national governments and international donor agencies.

Recent work indicates, however, that private spending on health care in low income countries remains quite high as a percentage of income, and may in fact account for two-thirds or more of total health expenditures (Golladay and Liese, 1980). In rural Afghanistan, for example, approximately 7.4 percent of household income is spent on medical care. This accounts for 88 percent of all health care expenditures in the country (O'Connor, 1980). Evidence such as this suggests that it may be desirable to redirect private spending to public clinics instead of replacing existing private outlays with scarce and expensively collected government monies.

An alternative to the current method of financing public medical services, included here solely as an illustrative example, would be to use government resources to reduce the nonpecuniary impediments to using public clinics, while requiring private resources to pay most or all of the direct cash costs. Directing governmental expenditures to projects that would reduce nonpecuniary costs would have side effects on other important sectors of the economy. For example, government money spent on roads and public transportation to make an unsubsidized clinic widely accessible might simultaneously improve the food distribution system, widen markets, and lessen the deleterious effects of the weather. Thus it may be the case that

use of existing modern health services could be expanded indirectly by efforts that would lead simultaneously to more opportunities for earning cash incomes, getting an education, and increasing mobility. Direct subsidization of specific health facilities has no potential for introducing any of these spillover effects.

Resolving issues such as these requires evidence of the willingness of clients at given income levels (and having other relevant environmental and personal characteristics) to pay for medical services. This is a point never addressed in a literature which takes as its premise the free provision of these services.

INCOME AND DISTRIBUTION

A central tenet of the "basic needs approach" in general and of the primary health care movement in particular is that government services should be provided to the least well-off in order to distribute the gains from development more equitably than in the past. Thus a country's health goals usually have a distributive component that causes attention to be paid to the level of family incomes. Unfortunately, simply placing a clinic in a very poor area--the current approach--does not assure that the poor will be any less frustrated than before in trying to use modern medical services. There are simply too many other considerations that must be taken into account before the distributional objectives can be claimed to have been met.

For example, a small Methodist-affiliated clinic in an isolated region of rural Haiti was in 1974 the only clinic of any sort offering treatment for tuberculosis in the area. Approximately 73 percent of the local

population reacted positively to a tuberculin skin test so, not surprisingly, 75 percent of the clinic's case load was tuberculosis patients. Virtually none (1.9 percent) of the patients were children under five, and most of the adults who used the clinic did not do so until they had become debilitated by the disease. Even so, 75 percent of these patients quit the program within the first six months of treatment, and only 1.4 percent of all cases treated between 1967 and 1970 were claimed by the clinic to have been arrested.

Reasons for the high rate of attrition and the low success rate included the high cost of drugs, the absence of cash in the peasant economy for most of the year, the unexpectedly high value of mothers' time in the local economy, the nonconformity of clinic hours to customary marketing and travel patterns, a very specific problem of translating modern medicine's understanding of tuberculosis and its treatment into the local language, and, of course, the complicating fact that several weeks of chemotherapy leads to some remission of the symptoms (Wiese, 1974).

While this clinic was located in a poor region and served a low income clientele, the treatment regimen alone cost half of a local peasant's average monthly cash income every week for the first ten weeks of treatment. In addition, patients often had to sell land or cattle so that they could take up residence near the clinic during those ten weeks in order to get the required thrice-weekly injections. All of this expense had to be incurred with only a slight probability of success in the treatment.

It may be argued that this example is irrelevant to a discussion of using public medical services to ameliorate the effects of poverty since the clinic in question was charitable, did not offer free services, and had a very specific function. In fact, this example contains in a nutshell

virtually all of the problems faced in delivering governmental medical services to the rural poor. Unless there is extreme sensitivity to the conditions of life in low income agricultural areas, there is a high probability that any disruption of the status quo, even if it is nominally free, will impose expensive new burdens on the population. In an economy where cash is scarce, time is, literally, money.

In the example above, such minor changes as the hours of operation or a less intensive and more appropriate treatment regime, while not necessarily reducing the cash costs of the clinic, would have made it more affordable in real terms. Similarly, installing a free government clinic in the area as a way to serve the poor better would probably be much less effective than providing transportation to, or free drugs at, the existing clinic.

Using primary health care programs as part of an attack on the effects of poverty makes understanding the different types of costs associated with a clinic even more crucial than it would otherwise be. At the very least, a well-planned network of primary health care facilities requires an awareness of the income classes being served and the conditions under which they live. These are two pieces of information rarely known today.

A related issue concerns how changes in income affect utilization patterns. It is likely that public medical services are an <u>inferior good</u>.[1] Accordingly, economic development efforts which raise incomes may have the effect of drawing patients away from public clinics and toward private facilities. A high probability that this will occur in a specific region may suggest to planners that resources can reasonably be directed elsewhere and that temporary, flexible plans may be desirable.

KNOWLDEGE AND OTHER FACTORS

Often it is noted that sex, education, place of residence, religion, income, and other individual or household characteristics affect usage patterns We review much of the relevant literature in this paper. In the economic model we estimate, it is necessary to include these demographic and personal characteristics in order to isolate the effects of the economic variables of interest. As a consequence, it will be possible to evaluate the importance of the role played in treatment decisions of education, residence, and so on, through their effects in a fully specified model. This will be a vast improvement over the simple correlations that have heretofore been relied on in the literature.

THE STUDY

Our goal is to provide a comprehensive description and analysis of the use of primary health care services in low income countries. The focus is narrow in that we make no reference to the admittedly major health care delivery problems low income countries face. These include the necessity of reordering international and national priorities in an atmosphere of slow-moving bureaucracies, entrenched patterns of national health expenditures, powerful proponents of the status quo, drug procurement and distribution problems, an apparently inappropriate and pervasive preoccupation with high technology medicine, and many other difficulties. All of these issues have been addressed elsewhere and are well known.

These factors are taken as givens here. On the assumption that there is an interest in providing primary health care at the local level and that

microeconomic theory is an appropriate tool for structuring the analysis of the use of health facilities, this work can be quite useful in the design and evaluation of primary health care programs.

There are three different levels of discourse. Chapter 2 reviews the available evidence on patterns of use of the relevant health services. To the extent possible, this approach provides a snapshot of what is currently known about how public, private, and traditional practitioners are used.

Chapter 3 presents a framework specifying the factors which are hypothesized to determine the demand for each of the sources of care. We present an analytic review of what is known of the pathways through which these factors operate and the effects they have on use. In some cases new hypotheses are presented for later testing in a multivariate model. Taken alone, Chapter 3 should be understandable to almost anyone. It could be used by analysts as a guide for future work or used in the field to provide a structure for data collection and as an introduction for health professionals and other noneconomists to a logical economic framework that can be used for planning and evaluation.

Chapter 4 reviews the work done on economic models of the demand for health. Also included is a brief comparison of the different approaches taken by sociologists, anthropologists, and geographers, although these are actually reviewed more thoroughly as a by-product of the work done in Chapters 2 and 3. Chapter 4 is fairly arcane and relevant only to those interested in the derivation of the general model presented in Chapter 5. The estimation of demand equations that result from this model is explained in Chapter 6 and analyzed in the context of the existing structure of health services in the Philippines. This work is fairly complex, but the conclusions should be of general interest.

Chapter 2. PATTERNS

SOURCES AND COVERAGE OF MEDICAL SERVICES

The organization of health services in most low income countries follows a common pattern. Almost without exception, the government, through its ministry of health, pays for and operates a network of public facilities. This system follows a pyramidal structure, with a few major urban hospitals at the top, a second tier of regional dispensaries, a third level of rural health centers and maternal/child clinics, and a final layer of rural sub-centers or clinics serviced by resident or itinerant health workers.

Specialty hospitals for lepers and tuberculosis victims are also maintained, and occasionally public facilities provide mental health services and dental care. Most countries, particularly the former French colonies in Africa, also conduct immunization campaigns (Imperato, 1974; Snyder, 1974).

Two other sources of care are available in some countries. Especially in Latin America, social security systems exist which maintain a separate set of hospital-based institutions. These serve only the enrollees of the system, who are usually limited to governmental and regularly employed

private workers. Military health facilities can also be a source of public medical services, although their importance depends on local rules and the relative size of the military in each country. In Jordan, for example, the military accounts for 32 percent of the country's hospital beds and 28 percent of the physicians (Gallivan, 1977). There is virtually no information available on civilian access to military facilities, but in the Dominican Republic, for instance, the military provides free care to the parents, siblings, children and spouses of military personnel. This explicit group of eligibles indicates that coverage is relatively broad, but in practice, since registration procedures tend to fail to screen out ineligibles, military health facilities may be more widely used than even this formal definition suggests (Lashman and Daly, 1974).

In addition to governmentally supplied services, in most countries there is a significant presence of charitable institutions and religious missions which provide medical care free or for a nominal fee. Naturally these private charitable groups do not provide systematic geographical coverage, but where they exist they usually provide services which would not otherwise be available. In Zaire it is estimated that mission groups provide up to 75 percent of rural modern health services, spend $681,000 annually (compared to government expenditures of $20 million), and employ 30 percent of the country's health manpower (Lashman, 1975). Given the low cost of religious labor, the dollar amount of mission expenditures probably understates the actual contribution of missions relative to that of the government.

Despite the existence of free sources of care, often provided at considerable governmental expense, nearly every one of these countries also sustains a private sector which provides fee-for-service medicine. In fact,

many countries allow public physicians and midwives to supplement their incomes by maintaining private practices. The coverage of private practitioners, however, is usually limited to a relatively small urban middle and upper-income clientele. Consequently, rural residents have virtually no access to this sector unless they happen to be covered by physicians or nurses employed at a plantation or a mining company.

This situation should naturally lead to an analysis of the unequal supply of modern medical resources in urban and rural areas of low income countries. Quotations such as the following are de rigueur for any discussion of primary health care:

> In India, for instance, while 80% of the population lives in the countryside, 80% of the doctors have settled in urban areas . . . . Furthermore, available estimates in India show that by rural-urban break up of services, urban population has 8-10 times more institutional facilities and 12 times more hospital beds. (Bhatia et al., 1975, p. 15).

> About 20% of Nigeria's estimated population of 80 million live in urban areas. 70% of all the doctors in Nigeria are concentrated in seven cities, six of which are those in which the older medical schools are located. More than half of the remaining 30% of available doctors are concentrated in the other big towns in the country (Oyebola, 1980b, p. 23).

> In 1950 the 3,000,000 Haitians living in smaller towns and rural areas [92 percent of the population] were served by

only 26 physicians, a ratio of fewer than 1:115,000. This ratio remains unchanged (Wiese, 1974, p. 359).

It appears, however, that these quotes represent a position that is far too simple a treatment of the issue. Large, expensive institutions (such as hospitals) naturally tend to be located exclusively in urban areas, a situation which has some logical basis but which of course skews expenditures and practitioner coverage towards cities. It is often claimed that these institutions, which usually provide free services, deliver care to a whole region or province without prejudice. This contention is quite reasonable unless questions of access and appropriateness are raised, and these issues tend to lead to a clash of medical service delivery philosophies.

For either side however, the question of urban versus rural should be one of access, or the total cost of consuming the service, rather than one of location per se (see pp. 87-96). For example, modern medicine was not accessible to the small Mexican village of Pichartaro until a dirt road was built from the village to a main highway in 1972. With the introduction of taxi and bus service to the village, local residents could avail themselves of high quality private and public medical care located in a city that was suddenly only one hour away by bus. While the urban/rural distribution of facilities was not changed by the construction of this dirt road, the economic distance to the facility was reduced from near infinity to a trip of manageable cost in terms of both time and money. Existence of the road caused a radical increase in the villagers' consumption of modern medical services, whereas attempts to provide an aide station directly in the village had been much less successful in affecting traditional usage patterns because of the perceived low quality of the care offered there (Young, 1981).

So, while it can be stated unequivocally that low income countries in

the aggregate have a lower supply per capita of all kinds of modern medical personnel than exists in high income countries[2] and that the distribution of resources within countries tends to be skewed towards cities (and in rural areas, towards villages), it is not obvious that this is an unambiguous argument for simply increasing the local supply of personnel. One thing is certain, though. Despite a formal structure of medical care that mimics the Western or colonial model, resources in personnel and cash are not adequate to make modern physician-oriented care a realistic goal in the Third World even if there were agreement on its desirability (see Bicknell and Walsh, 1977).

Consequently, the importance of traditional healers in the medical systems of most low income countries and their role as the "basic core of primary health workers for about 90% of the rural population" (Oyebola, 1980b, p. 23) must be recognized. Moreover, the continuing existence of a large contingent of traditional healers as well as a strong desire to use them are testaments to the persistent vitality of this sector.

Even in high income and highly educated communities in developed countries, where there might be a tendency to scoff at the practices of the traditional healers of the Third World, there is a vast array of prosperous chiropractors; osteopaths; acupuncturists; physical, mental and social therapists; massage enthusiasts; restructurists; diet consultants; astrologers; and all other manner of informal health practitioners that exist side-by-side with a highly technological, specialized and scientific medical establishment. These practitioners clearly meet real or perceived health-related needs not satisfactorily treated by the modern medical system, even where modern care is universally available. Thus it should be no surprise that there continues to be an abundance of traditional practitioners

in low income countries. They are used by necessity where no alternatives exist and voluntarily in cases where other practitioners are available but the patient considers the traditional healer to be more appropriate (either for economic or other reasons).

What usually distinguishes traditional practitioners from their modern counterparts is a lack of formal medical training in a body of collected scientific knowledge. While in some countries traditional practitioners do receive a medical education (ayurvedic in India), undergo an apprenticeship according to local custom, or carry on their parents' work, in most cases an individual gradually becomes known as a healer over a number of years and is called on increasingly to perform medical duties. This often happens with traditional midwives, who begin by offering informal birth assistance to family and friends but become known as midwives when other people begin to ask for their services formally. Having assumed this role, the midwife gradually becomes a resource for all kinds of health problems. Other healers who are recognized for their spiritual or magical powers simply realize their talents (or are "called" by a divine experience), begin to use them, and gain a reputation on the basis of their proven effectiveness in either making cures or in making illnesses understandable as outcomes of certain life events that have importance in the local belief system. (See Cosminsky, 1977a; Imperato, 1974; Ngubane, 1981; Oyebola, 1980a, 1980b; Taylor, 1976; and much of the medical anthropology literature for details of traditional training and practices.)

The effectiveness of the traditional system depends on the accuracy of diagnosis (as does modern medicine--see Gould, 1965, for an excellent example), the power of traditional medications, and the extent to which an illness is due to a physical or mental disorder the practitioner is able to

treat. A significant part of all traditional medicine revolves around the birth process and the role of the traditional midwife. Here especially the effectiveness of the system depends on the midwife's experience and the validity of local practices. While the validity of specific customs can be quite variable across regions, the usually predictable and common biological aspects of the birth process make the experience and support of any midwife, whether trained or not, quite useful to the expectant mother.

Although it is difficult to generalize across countries about specific practices, traditional midwives typically offer the mother prenatal, delivery, and postpartum care. A 1981 survey of health facilities in a three-province rural area of the Philippines found that 93 percent of the sample of 194 traditional midwives (hilots) offered prenatal care, 98 percent offered home delivery services, 20 percent offered clinic delivery services, but only one (.52 percent) hilot claimed to make well-baby visits. Many of the hilots also claimed to be herbolarios--traditional healers in the Philippines. In that role they also offered adult outpatient services (62 percent) and child outpatient services (53 percent). Personal observations by anthropologists tend to confirm this picture at least for the countries of Guatemala, Nigeria, Mexico, Thailand, and a few others (Cosminsky, 1975, 1977a; Jelliffe and Bennett, 1962; Muecke, 1976; Sargent, 1982; Young, 1981).

Attempts have been made to classify traditional delivery practices according to whether they are beneficial, harmless, harmful, or of uncertain effect. On a Guatemalan finca, the following traditional practices have been observed to be beneficial: using the kneeling position for birth, cauterizing the umbilical cord, postpartum restrictions on mothers' activities, massages throughout the course of the pregnancy and afterwards,

traditional bathing of the mother after birth, avoiding stressful situations which might promote susceptibility to the evil eye, and the presence of the husband and midwife at birth. Harmless activities included ritual disposal of the umbilical cord and placenta, avoiding eclipses, and interpreting signs from the umbilical cord. Practices identified as potentially harmful were dietary restrictions on the mother (not eating humorly classified "cold" foods), the prohibition against feeding colostrum to the newborn, and the heavy activity of the mother before and soon after birth. Practices with uncertain effects were the use of herbs and herb teas, heavy wrapping of the infant, and the use of abdominal binders (Cosminsky, 1977a). To put this classifying exercise in perspective, modern practices of uncertain and potentially damaging effect include the heavy use of anesthetics, the common use of labor-inducing drugs, placing antiseptics in the eyes of the newborn, the mother's reclining position during birth, the possible overuse of forceps in delivery, and the social isolation of the mother in a clinical setting.

Thus traditional and modern obstetrical practices both have advantages and disadvantages, some more serious than others. Specific, harmful practices of traditional midwives, which often involve mishandling of the umbilical cord (leading to tetanus neonatorum) and the inability to deal with complications, can be remedied with highly specific educational efforts aimed at teaching hygienic procedures and explaining the warning signs of problem births (Mangay-Angura, 1977; Spring, 1980).

Thus the experiences of traditional midwives have led them to adopt many practices which probably facilitate safe, uncomplicated deliveries. As might be expected the reputation of a midwife is closely tied to her ability to avoid maternal and child deaths in her practice. In the Mexican

village of Pichataro mentioned previously, one midwife experienced a drastic reduction in her practice after the death of a mother under her care (Young, 1981). Thus it is in the interest of the midwife to adopt safer practices if she can be convinced that they are improvements.

Experience also affects traditional medicine by making it a dynamic, changing system quite different from the static one it is usually taken to be. The most important change that has taken place in traditional medicine is, of course, the introduction of modern medicine. Modern practices are imitated, modern pharmaceuticals are used, and often certain pieces of equipment (like stethoscopes) are adopted.

A survey of 59 full-time indigenous practitioners in Pakhowal Block, Punjab, India, (where 80,000 people resided) was conducted about 17 years ago. Thirty-seven percent of the practitioners had taken some kind of modern training, and in 16 percent of the examinations observed during the survey, modern instruments were employed either correctly (3 percent) or incorrectly (13 percent). Most of these examinations concluded with a "prescription" for, or a dosage of, a modern medicine (82 percent), or some combination of modern and indigenous medicines (5 percent). Only 12 percent of the patients were given indigenous drugs exclusively (Taylor, 1976). Another survey conducted in three states of India in 1972 discovered that approximately 70 percent of the 93 full-time traditional practitioners surveyed used modern medicines either exclusively or in combination with indigenous medicines (Bhatia, et al. 1975).

As a by-product of the previously mentioned survey of health facilities in the Philippines, it was found that traditional midwives (hilots) and healers (herbolarios) commonly used simple drugs such as analgesics and antipyretics in combination with folk cures to treat both general symptoms

and such self-limiting diseases as influenza. In addition, some hilots and herbolarios were found to give follow-up injections of drugs which had been originally prescribed by modern health practitioners, who had administered the initial dose. One trained hilot ran a six-bed birth-attending clinic that was successfully extending maternal and child care services in an area served also by a nearby private clinic, a private hospital, and a municipal government health clinic (Oliva, 1982).

The following quotation helps to put the situation in perspective:

> A casual episode opened up a whole new range of inquiry. As a patient was going out, Mr. Bhatia, our social scientist in the Punjab, said to a Vaid, "What was that medicine you gave him?" The practitioner handed the bottle to him, saying, "I can't read English. Why don't you read the label and tell me what it is?" Bhatia saw that it was one of our most powerful and potentially dangerous antibiotics, but written in Punjabi across the top of the label was "Bukhar de liye," or "for fever." He was then shown other bottles of standard drugs with similar Punjabi inscriptions specifying diarrhea, conjunctivities, or cramps. When Bhatia asked the Vaid where he had gotten his medicine and learned how to use it, the practitioner said, "Oh, my friend the pharmacist in Ludhiana keeps me up to date."
>
> In following up this lead, we uncovered not only an underground system of health care providing the bulk of medical treatment for the people of India, but also a widely pervasive and previously unrecognized separate system of medical education. The professors are the drug-detail men from pharmaceutical

companies, often the largest and most reputable companies in the world. The junior faculty are the pharmacists in the cities. Each pharmacist has a continuing class of practitioners scattered throughout the neighboring villages. The practitioner will drop into the pharmacist's shop and say, "I am seeing a lot of conjunctivitis these days. What do you have that's good?"

The indigenous practitioners of Ludhiana District have organized an association and have monthly meetings to discuss clinical cases and new treatments. The government has set up a registration system, but essentially no control.

When we told the health authorities of India about our findings, it was apparent that few had realized the extent to which the new pattern had spread. The general stereotype was that indigenous practitioners were still dealing in "jari-booties," herbs and roots which can safely be considered innocuous, even if not beneficial. One Vaid in our area has developed a tremendous reputation and is reputed to make an income of 200,000 rupees a year. As I watched him practice, it was apparent that his reputation was built on penicillin. A large syringe was used to inject a sizable dose into successive patients, the only gesture toward sterilization being that he would wave the needle through a dirty pan of weak antiseptic. Health officials are shocked; but the reality is that until something better is provided, such practices will continue to respond to existing demand. The greatest source of hazard is the tendency of such psuedo-indigenous practitioners to use the most powerful drugs possible in order to get quick results. For instance, one of the most commonly used drugs is

chloramphenicol, with no realization of its toxicity. (Taylor, 1976, p. 288-89)

Thus the health care systems in low income countries, while appearing in a formal sense to mimic the systems of high income countries, are in practice centered around a rapidly changing system of indigenous care. It would be desirable to quantify the relative coverage of the modern and traditional systems, but the types of statistics available tend to be misleading or irrelevant. Some countries tabulate the number of unattended deaths or death certificates not signed by a physician as an indicator of access to modern care. This practice is based on the assumption that the greatest effort to seek medical help would occur at the time of death. Such statistics probably overestimate coverage since many unattended deaths are probably never reported. Another approach is to tabulate the percentage of reported deaths due to ill-defined or unknown causes (PAHO, 1970). This is an extremely subjective measure and not necessarily an indicator of medical care access.

Some governments have attempted to estimate directly the coverage of all modern facilities (not distinguishing between public and private). These data are usually estimates derived from the assumption that the service area of each facility extends five to ten kilometers around it, or the data come from actual sample surveys. Table 1 presents some of the evidence.

In high income countries the coverage estimate would approach 100 percent, not necessarily because geographic coverage is more even, but because the populations are more urbanized, and better transportation facilities are available. The data presented, while only approximate, indicate that coverage of modern medical services (in these countries at least) is, indeed, quite low. Even so, the situation varies considerably by country even for this small sample, with the poor Asian nations clearly having the

TABLE 1. Coverage of Modern Medical Facilities--Selected Countries, 1966-76

Area and Date	Percentage Covered
ASIA	
Afghanistan (1976)[1]	15
Bangladesh[2]	10
India[3]	10
Pakistan[4]	15
Papua New Guinea (1974)[5]	27
People's Republic of China[6]	?
Thailand (1970)[7]	35
LATIN AMERICA	
Dominican Republic (1968)[8]	40 (rural areas)
El Salvador[9]	86 (MOH estimate)
Haiti[10]	30 (catchment area = 15 km.)
Honduras[11]	67
Nicaragua[12]	50
AFRICA	
Ethiopia (1969)[13]	10-20
Ghana (mid 1960s)[14]	25
Swaziland (1966)[15]	60
Tunisia (1968)[16]	79
Zaire (1973)[17]	20

Sources:
1. Estimate based on O'Connor (1980).
2. Loomis (1976).
3. Johns Hopkins University (1976).
4. Furnia (1976).
5. Hetzel (1978), p. 44; 73 percent of population is more than one hour by foot from a medical installation.
6. Hetzel (1978), p. 125. In Loyan People's Commune there is one medical worker (a production team health aide) for every 10 households and a medical unit for every 20 households; 85 percent of the production brigades have adopted this system nationwide, which suggests at least this level of coverage by some sort of medical personnel.

Table 1. Continued

Sources:
7. Woolley (1974).
8. Lashman and Daly (1974).
9. Woolley et al. (1972).
10. Beamer et al. (1972).
11. Woolley et al. (1972).
12. Holland et al. (1974).
13. Britanak et al. (1974).
14. Beamer and Gangloff (1974).
15. Pielemeier (1975).
16. Benyoussef and Wessen (1974).
17. Lashman (1975).

more serious deficits.

Since coverage is defined solely on the basis of distance, it should be noted that this type of information does not measure other barriers to utilization such as service fees, pharmaceutical costs, transportation expenses, and expected waiting time. Consequently, coverage is likely to be overstated in table 1 for low income households.

Another type of statistic commonly used to describe the coverage of medical services is the per capita supply of practitioners. This measure usually overstates access since it assumes that practitioners are distributed throughout the country in proportion to the population. This is, of course, not the case. Still, this proportion is easily collected and provides a rough measure of per capita supply that can be compared across countries (for actual comparisons, see Golladay, 1980). Table 2 shows the relative supply of traditional and modern practitioners, using this type of measure, for six countries. For this group of countries, the average per capita supply of traditional practitioners is 11 times greater than the average per capita supply of modern practitioners.

Some direct evidence of the relative availability of all types of medical services can be culled from the previously mentioned survey of medical facilities in the Philippines. Table 3 gives the results for the 100 barangays[3] surveyed.

While the numbers in the second column indicate, in a formal sense, almost complete coverage of the region by all types of facilities and practitioners, the figures in the third column suggest that access to modern facilities is quite limited if distance to the facility is an important barrier to usage. Assuming a 5 km radius service area for each facility or practitioner, the last column gives an approximation of the

TABLE 2. Relative Supply of Traditional Practitioners--Selected Countries

Country	Ratio: Population per Single Provider	
	Traditional[1]	Modern[2]
Bangladesh (private rural practitioners)	1,554[3]	2,459[3]
Ghana	421	10,200
India	1,300	3,140
Nigeria	532	14,810
Tanzania (traditional: wa ganga)	357-454	18,490
West Malaysia (traditional: bomoh)	441	4,350

Sources:
1. Good (1977), p. 710 (except as noted).
2. Golladay (1980), pp. 71-74 (except as noted).
3. Claquin (1981), p. 154. Modern includes qualified and unqualified allopaths. There were 57 allopaths with medical degrees and/or licenses, each serving an average of 35,413 people; the other 764 "modern" doctors were unqualified allopaths with no degree or license, covering an average of 2,642 people each. Thus modern does not necessarily mean highly trained. Traditional includes homeopaths, ayurvedics, Unanis, traditional midwives, spiritual healers, bonesetters, and others.

TABLE 3. Supply of Health Facilities and Practitioners--Bicol Region, the Philippines, 1981

Type of Facility	(1) % with at Least 1 M.D.	(2) % of Barangays Served	(3) Mean Distance to Facility for Barangays Served (S.D.)[1]	(4) % of Barangays Served Located within 5 km of Facility
Public clinic	94	100	7.4 km. (10.13)	58
Private clinic	100	100	8.02 km. (9.8)	51
Public hospital	100	98	19.0 km. (17.12)	26
Private hospital	100	95	13.7 km. (14.7)	37
Traditional midwife	0	98	1.09 km. (.39)	100
Traditional healer	0	96	1.09 km. (.29)	100

Note: 1. S.D. = standard deviation

Source: Griffin et al., 1981

number of barangays claimed to be served and which actually have access to the facilities. This size service area may be too small for hospitals; if it is doubled to 10 km, then 39 percent of the barangays fall within the service areas of hospitals. It would be necessary to increase the service area to 63 km, however, to achieve 100 percent coverage for private and public hospitals. By similar reasoning, the 100 percent coverage claimed in column 2 for public and private clinics would require service areas of 57 and 62 km, respectively.

To qualify the numbers in table 3 further, it is necessary to indicate the relative supply of the different facilities and practitioners. No barangays are served by more than one public clinic, although 2 percent are served by a second public hospital. Approximately 28 percent are served by a second private clinic and 11 percent by a third; 16 percent of the barangays are served by a second private hospital. The barangays with additional modern facilities are located in urban areas.

In comparison, the supply of traditional practitioners is quite impressive. About 92 percent of the traditional midwives (hilots) are located in the barangays they serve, and 55 percent of the barangays are served by a second hilot (96 percent of whom live in the barangay). In 30 percent of the barangays, a third hilot is available, 16 percent have a fourth, 9 percent have a fifth, and 2 percent have a sixth. The coverage of traditional healers (herbolarios) is slightly more intense. Almost 93 percent of the barangays have an herbolario in residence, and 56 percent are served by a second herbolario [illegible] percent of whom live in the barangay). Another 32 percent of the barangays have a third herbolario in practice, 18 percent have a fourth, 12 percent have a fifth, 5 percent have a sixth, and 2 percent have a seventh.

In comparison to other low income countries, the Philippines is richly endowed with both public and private modern practitioners. In Manila in 1970, the ratio of doctors to population was approximately 1:375; in rural areas it was 1:5,000 (Woolley et al., 1972d). Yet the supply of modern providers apparently does not even begin to rival access to traditional practitioners.

The evidence presented in tables 1 through 3 seems to confirm the proposition that low income countries depend on indigenous practitioners for a high proportion of their medical needs, just on the basis of relative supply. Nevertheless, the picture is incomplete because investigators tend to ignore the most pervasive of Western practitioners, the pharmacist. In the medical systems of most low income countries, where the dispensing of drugs is neither highly institutionalized nor easily controlled by the governments, the pharmacist plays an active role in diagnosing disease and prescribing drugs.

The pharmacist also acts as a cultural broker between the traditional and modern systems. In that role, he may sell various oils and concoctions as well as pharmaceuticals. Pharmacists serve as both a primary or first level resource, as well as a secondary level one resulting from prescriptions from physicians and other practitioners (including traditional ones). In analyzing the use of pharmacists, it is difficult to separate out of the number of pharmacy visits exactly how many are made in conjunction with other needs or are the result of previous visits to other practitioners. It is also difficult to separate out how many may actually be a form of self-treatment using over-the counter sales, since prescriptions are rarely needed in many places. In some cases, the patient knows the names of the drugs that he or others he knows have used previously and asks the

pharmacist or salesperson directly; in other cases, he seeks advice from the pharmacist, using him as a lay doctor. Some studies may classify the former as self-treatment, with the latter classified as use of the pharmacy; many studies do not differentiate these uses of the pharmacy.*

Pharmacies tend to be privately operated and are usually much more widely dispersed than any other institution of the modern medical establishment. In Afghanistan there are at least 500 pharmacies as opposed to 138 basic health centers. A 1976 three-province survey in Afghanistan indicated that 60 percent of all households had used a pharmacy in the previous year and had spent an average of 37 percent of their health budgets there. In comparison, 50 percent had used a basic health center and 26 percent had used a regional doctor. (Six percent of household health budgets was spent at basic health centers and 9 percent went to the regional doctor.) As implied above, it is not certain that all of the pharmacy visits were made exclusively for seeking health advice from the pharmacist. However, 9 percent of those who were ill in the two weeks before the survey used a pharmacy as a source of treatment, compared to 25 percent who used basic health centers and 10 percent who used regional doctors (O'Connor, 1980).

Some of the reasons for using pharmacies are apparently rooted in economic thinking. In Guatemala, people sometimes go directly to the pharmacist because they can receive an injection there without any questions being asked, whereas at the clinic, they have to wait, be examined, and then may be given pills instead of an injection, which they prefer (Cosminsky, 1972). Young (1981) reports that in Mexico, people often use pharmacies to avoid a physician's consultation fee, thus making it a cheaper resource.

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* Sheila Cosminsky, personal communication, April 20, 1982.

The effectiveness of pharmacies and the training of pharmacists are two important unknowns in this discussion. Taylor, in the quotation on page 20, suggests that pharmacies are the basis of an underground or informal system for dispensing powerful pharmaceuticals that in high income countries are tightly controlled. At any rate, pharmacies must be recognized as an integral component of the medical systems in low income countries; it is unfortunate that data are not available to measure the extent of the role.

This section has focused on the different sources of medical care available in low income countries. We have tried to supply a context for treating traditional medicine as a rational alternative to modern medicine. In addition, we have discussed the relative supply of the different practitioners and the issue of pharmacies as a source of treatment. In the following section, we analyze actual utilization patterns for these practitioners.

UTILIZATION: CURATIVE FACILITIES

A Methodological Aside

A common method of discourse in the literature on utilization is to note the inadequate supply and coverage of modern medical resources as we have done, then to claim that existing services are not well used. For example, Bahtia's quotation on p.13 is followed by this statement:

> These meager facilities available are also not being properly utilized by rural people due to a variety of reasons . . . only about 10 per cent of rural population utilize the Government medical facilities. (Bhatia et al., 1975, p. 15)

This comment on utilization appears to be inconsistent with evidence from

studies of clinic operations.

Analyses of staff work patterns almost universally convey the impression of a frenetic level of activity. A typical example is a WHO study of several health centers in India (to which the above quotation refers), where medical officers were seeing 100 to 130 patients in a five-hour working day. By simple arithmetic, this means that each patient received two to three minutes of attention (Sharma and Chaturvedi, 1978). Similarly, the long waiting times experienced in public clinics and documented later in this study also suggest that outpatient clinics are overused.

This apparent inconsistency of claims for use and analyses of staff workloads may be because of the collection of misleading statistics on facility use. The comment that services are underused is normally substantiated by citing (1) the number of users versus the number of people in the service area, (2) the number of users versus the number of sick in the area, or (3) the number of users relative to the incidence of disease and morbidity in the region. Such indicators actually measure the supply of services rather than demand or use; furthermore, they cannot be used to compare different services. To illustrate, suppose a local health center is used to its capacity of 100 patients a week. At the same time an epidemiological survey finds 1,000 sick people in the service area of the clinic. The conclusion could be drawn that only 10 percent of the sick are using the clinic, yet such an interpretation would fail to convey that clinic use is at 100 percent of capacity.

The statistics of interest, therefore, are quite different from those often collected. Useful data would include the number of users relative to capacity as well as the change in patient load over time for a constant-sized staff. The time frame is important too, since the hours of operatio

may change over time and are different for different practitioners.

Another problem with much data is that public services are often used for the "wrong" purposes. As mentioned in the introduction, governmental clinics are usually designed to offer public health services such as sanitation advice, water source inspection, nutrition education, and immunization campaigns, as well as curative care,[4] maternal and child care, and family planning assistance. Characteristically, however, public clinics are so overwhelmed by the demand for curative care that the other functions are difficult to carry out. Observation of the patient load of these clinics would probably lead to the conclusion, based on the approach advocated above, that such a clinic was overworked and overused. The caveat would be added that the operation would be more effective from the planner's point of view if it were allowed to perform adequately its intended functions. (This statement assumes, of course, that unsatisfied demand exists for the other services, along with a willingness to pay the associated costs.) In the most commonly used statistics, however, these installations would be classified as underused because their services (other than the curative ones) reach almost no one. With these limitations in mind about the data on which some of the following tables are based, they can provide some information concerning medical services use in poor countires.

Hospitals

There is evidence that hospitals are both absolutely underused and probably inappropriately used as well. By Western standards, Third World hospitals have low average occupancy rates. These rates tend to be lower for rural areas and private hospitals than for urban public hospitals. In addition, the average length of hospital stay in low income countries tends to be

greater than in high income countries both because the hospitals are slower to complete procedures and because patients are often reluctant to leave. Moreover, it is important to realize that hospitals in low income countries, particularly rural hospitals, often do not perform the hotel functions that their high income counterparts deliver. It is necessary for patients to provide their own linens and food; they are often accompanied by a relative who looks after these household tasks. Thus the cost in time, money, and inconvenience associated with using inpatient services can be quite high for a household (Spring, 1980)

Hospitals, like other institutions, cannot escape the possibility that they will not be used as intended. However, because the inappropriateness of the use of hospital facilities is embedded in occupancy and length-of-stay statistics, it is often overlooked. Since hospital beds are the most expensive of all medical services, it is important in allocating scarce resources to be certain that beds are filled with the most appropriate people, namely those who need surgery or tests, or who require treatment that can be given only in a hospital. A study in Honduras revealed that 20 percent of hospitalizations were preventable or could have been handled elsewhere had adequate facilities been available. These nonessential usages included hospitalizations caused by nutrition deficiencies, infectious diseases, complications of pregnancy, and abortions (Woolley et al., 1972e). Thus the occupancy rates in table 4 may be overstated relative to those in high income countries. For interpretation and comparison purposes the occupancy rates should certainly be adjusted for the long stays experienced by patients.

For comparison, average occupancy for the United Stated was 74 percent in 1977 with an average stay of eight days (World Health Organization, 1980b).

TABLE 4. Hospital Use--Selected Countries, 1966-76

Area and Date	Occupancy Percentage	Average Length of Stay
LATIN AMERICA		
Argentina* (1967)	60	14
Barbados* (1968)	70	9
Bolivia* (1966)	60	14
Chile (1968)	76	10
Colombia (1967)	58	9
Costa Rica (1968)	74	7
Cuba (1966)	63	9
Dominican Republic*	72	8
Ecuador (1967)	60	10
El Salvador (1968)	77	9
Guatemala (1966)	83	17
Guyana (1967)	66	9
Haiti[1] Urban	63	-
Rural (Interior)	49	-
Honduras (1968)	66	10
Jamaica* (1967)	84	10
Nicaragua[1] Social Security	94	-
National Board	69	-
Panama (1966)	41	5
Paraguay (1968)	40	8
Peru (1967)	64	13
Trinidad & Tobago (1968)	78	7
Uruguay* (1967)	70	12
Venezuela* (1968)	78	9
AFRICA		
Botswana[1]	70	11.8
Burundi (1972)[2*]	75 (general*)	11.5
Lesotho (1973)[1]	77 (range: 61-104)	-

Continued

TABLE 4. Continued

Area and Date	Occupancy Percentage	Average Length of Stay
Madagascar (1975)[2]	27	7
Morocco (1975)[3]	74 (range: 26-110)	
Senegal (1975)[2]	82	17.6
Tunisia (1971)[4]	76 (urban)	11
	57 (rural)	7
ASIA		
Indonesia (1975)[2]	52	7.5
Jordan (1975)[5]	71 (civilian)	7
	59 (military)	-
	51 (private)	5
Sri Lanka (1976)[6]	115 (general)	6.7
Syria (1975)[7]	20-87 (range)	4-8 (range)
Turkey (1975)[2]	48 (general)	7.2
	20 (rural)	4.0
Western Somoa (1975)[2]	63 (general)	10.1
	23 (rural)	5.6

* Government hospitals only.

Sources: Latin American data from Pan American Health Organization , 1970.
1. Pielemeier, 1975.
2. World Health Organization, 1977.
3. Weissman, 1977a.
4. Beamer and Anderson, 1975.
5. Gallivan, 1977.
6. World Health Organization, 1980b.
7. Weissman, 1977b.

The average occupancy rate for the countries appearing on table 4 is 64.64 percent with an average length of stay of 9.53 days, but there is considerable variation both among and within countries. Where both urban and rural rates are available, the lower efficiency of rural hospital resources is striking.

A specific example may help to provide a bit of meaning for this list of numbers and suggest more strongly the importance that must be attached to efficient hospital use. In Liberia the government in 1969 spent 40 percent of its health budget to provide 1,120 hospital beds. Over the year, the hospitals served a total of 7,758 patients. One-hundred and forty-three of the beds were in maternity wards, which accounted for 4,383 (56 percent) of the patients. Two rural hospitals, Careysburg District Hospital with 20 beds and Harvey Hospital, Sanniguellie, with 25 beds, served 57 and 40 patients respectively (Gauldfeldt and Gangloff, 1973). These utilization rates are almost unbelievably low, but the averages presented in table 4 probably conceal a large number of similar cases. Caution is necessary in interpreting and comparing hospital use statistics for the reasons already mentioned but also because different types of hospitals (e.g., tuberculosis or psychiatric) have vastly different average lengths of stay and are occasionally lumped together. In addition, the demand for rural hospital beds is affected by weather, supply conditions, and staffing problems much more than is the demand for urban beds; so the intensity of use for rural hospitals may vary quite dramatically over the year.

A statistic which overcomes some of these problems is the average number of admissions or discharges per capita (or some other unit), but this is available for a small number of countries (see table 5).

TABLE 5. Hospital Admissions or Discharges per 1,000 Population--Selected Countries

Region and Country	No.
LATIN AMERICA	
Dominican Republic[1]	47
Honduras[2]	30
AFRICA	
Botswana[3]	57
Madagascar[4]	4
Senegal[4]	4
Swaziland[3]	150 (urban) 50 (rural)
Tunisia[5]	53
ASIA	
Indonesia	13
Sri Lanka	62
Western Samoa	42
OTHER[4]	
Canada	160

Sources: 1. Lashman and Daly, 1974.
2. Woolley et al., 1972e.
3. Pielemeier, 1975.
4. World Health Organization, 1977.
5. Beamer and Anderson, 1975.

Table 5 indicates that the per capita use of hospitals in low income countries appears to be no more than half (and usually much less) that in high income countries. In Swaziland, the only case for which there is an urban/rural breakdown, urban admissions are three times the rural average.

Other Curative Facilities

Most hospitals provide outpatient care, as do private doctors, government clinics, and traditional healers. Evidence of the differential use of these outpatient resources comes from a 1970 survey by the Thailand Ministry of Public Health of 14,000 families in 30 randomly selected villages. This survey found that the average Thai got sick twice a year and, when sick, used the sources of care in table 6. These figures suggest that in Thailand modern health facilities are not used in the majority of cases of illness, even in Bangkok. For reference, over 60 percent of all Thai doctors live in Bangkok, where the ratio of doctors to population is 1:1,000. In rural areas, the ratio is more on the order of 1:100,000 (Rosenfield and VanWie, 1979). It is interesting to note that in the face of these odds the use of modern care is as high as it is in rural areas. Another Thai survey disaggregated these sources of health care and tabulated use for eight regions of the country. It reveals even less usage of modern facilities by those who are sick, although it does show the importance of pharmacies (see table 7). On the whole, 17 percent of the families surveyed used public health facilities at least once a year (for all purposes) and 35 percent used modern health facilities, but it is clear that, relative to the other sources of care available in Thailand, the use of modern curative institutions was low.

In the Philippines, approximately 9 percent (1,100 people) of the

TABLE 6. Urban/Rural Differences in Health Care Use--Thailand, 1970

Health Care Source	Bangkok (%)	Rural (%)
Self-treatment, traditional healer, drugstore, or Buddhist monk	50	67
Health Center	1	8
Public or private hospital	16	8
Private clinic	33	17

Source: Woolley, 1974, p. 58.

TABLE 7. Sources of Health Care--Thailand, 1970

Source	% Using Source
Various drug stores	45
No treatment	24
Self-treatment	15
Private clinics	3
Government hospital	3
Government health center	3
Special clinics	3
Other healers	2
Neighbors, relatives	1
Private hospital	1
Traditional midwife	-
Chiropractor	-
N = 2,286	100%

Source: Woolley, 1974, p. 58.

Bicol Multipurpose Survey of 1978 sample reported an illness in the previous month. Of these, 62 percent (679 people) consulted some kind of practitioner (Popkin and Roco, 1979). If we assume the other 38 percent (421 people) treated themselves, then table 8 describes the utilization pattern for this sample.

For 949 of these sick individuals, it was possible to classify the type of treatment into four categories. Table 9 shows these aggregate groupings.

The pattern for this rural Philippine sample is similar to that of the urban experience table 6 shows for Thailand. The similarity of one country's urban results with the other's rural patterns may be because of a difference in behavior, but it is more likely caused by the different supply characteristics in the two countries. On the average, the Philippines contains twice as many doctors per capita and 22 percent more hospital beds per capita than Thailand (Golladay, 1980, p. 80). Both sets of results, however, indicate the importance of self-treatment and traditional forms of medicine.

Other less complete surveys reinforce these results. In Zaire, a study was made in 1973 of a 12,000 km^2 area inhabited by 400,000 people and served by facilities in Karumba (Kasai Occidental Region). For villages within 15 km of this center, an area from which 90 percent of the patients were drawn, only 23 percent of the ill used the available health facilities. In Tunisia, where there is a fairly complete and accessible system of public clinics (80 percent coverage), the 388 dispensaries (staffed by nurses and nurses' aides) provided an average of 180-200 consultations per morning in 1968. These figures indicate a high level of use, yet only 51.5 percent of the individuals in a 1968 survey had medical

TABLE 8. Practitioner Used--the Philippines, 1978

Practitioner	%
None (Self-treatment)	38
Doctor	45
Nurse	1
Trained Midwife	2
Traditional Healer/Midwife	12
N = 1,099	98%

Source: Popkin and Roco, 1979.

TABLE 9. Distribution of Visits by Type of Practitioner--the Philippines, 1978

Type of Practitioner	%
Traditional	13.06
Modern public	15.39
Modern private	28.66
None	42.89
N = 949	100%

Source: Popkin and Roco, 1979.

records, a measure of whether they had ever used a public clinic. For people who did use the clinics, each everaged 1.4 visits per year, substantially fewer than the number made in high income countries. Another interesting finding of this survey was that in both urban and rural areas, 85 percent of the ill had only one visit per illness. Urban residents, however, reported substantially more episodes of illness, causing utilization rates (visits per 100 users) to be about a third higher in urban areas (Beamer and Anderson, 1975; Benyoussef and Wessen, 1974).

In rural Bangladesh, where practitioners are available in the proportions give in table 2, the population has a choice of trained, modern practitioners as well as a variety of other untrained or empirical doctors. As the data in table 10, obtained from two different surveys and an examination of death certificates, indicate, there is a usage pattern that mimics quite closely those already examined.

In Morocco, the Ministry of Health found outpatient clinics experienced a range of .13 to 5.1 visits per capita, including repeat visits. The average number of visits per capita never fell below three in urban areas and was never above three in rural areas (Weissman, 1977a). In 1975, the Nicaraguan government operated 119 health centers and 152 health posts but experienced only .14 visits per capita per year including repeats (Heiby, 1981). These latter two examples suffer because no reference is made to clinic capacity or coverage.

Malaysian statistics contradict the impression of low usage conveyed by the foregoing discussion. In a survey of 1,465 households, 90 percent of those which had used a traditional practitioner in the previous months had also used a modern outpatient clinic (either government or private, or both). The mean annual number of modern visits for this group was 12.1,

TABLE 10. Rural Practitioner Use in Percentages--Bangladesh

Kind of Practitioner	Situation: Child Too Ill to Eat (N = 22,867)	Situation: Adult Too Ill to Eat (N = 11,489)	Treatment at Death (N = 915)
No one	14	22.4	26.6
Government doctor	17	10	10.8
Private allopathic doctor	38	8	26
Homeopath	13	-	-
Other, untrained	18	50.6	36.6
	100	91	100

Source: Claquin (1981) pp. 155-56.

while those using modern services exclusively made an average of 10.1 visits throughout the year (3.12 of them to private clinics and 6.98 to public clinics). Thus there appears to have been heavy, simultaneous use of all sources of care during this 12-month period (Heller, 1976). These Malaysian results may be more accurate than the Thai, Filipino, and Bangladesh ones already examined. Those surveys did not allow for multiple use and applied to a shorter time period.

Table 11 reports a second set of results for a single Malay village. In this case, five distinct types of therapy were available, along with the alternative of no treatment. The data are presented in a manner which controls for the seriousness of the illness.

These data are based on 520 completed episodes of illness distributed over 301 persons who were followed over a period of 24 weeks. These 301 ill people represented all but two households in the survey village. The results tabulated in table 11 tend to confirm the expectation of a substantial amount of self-treatment and heavy use of multiple practitioners by Malays.

However, the breakdown of the sample by relative impairment adds some new information. When there was no impairment (the respondent felt ill but could still carry on regular activities), over 70 percent of the sample used either no practitioner or the free government clinic. In cases of extreme impairment (bedridden), 79 percent of the sample used native practitioners or some combination of different practitioners. In other words, the sicker the people were, the less willing they were to depend on either themselves or the government clinic, and the more likely they were to exploit traditional resources or combinations of practitioners. Colson suggests that the movement away from the government clinic and toward traditional sources

TABLE 11. Health Service Use in Percentages--Malaysian Village

Service Option	Total Sample (N = 520)	Degree of Impairment		
		None (N = 209)	Moderate (N = 206)	Extreme (N = 105)
Government health service	26.5	42.1	17.0	14.3
Native health service	18.1	3.8	23.8	35.2
Private physician	5.6	0	14.1	0
Medicine vendors	7.5	12.4	6.3	0
Self-treatment	16.0	21.1	15.5	6.7
No treatment	4.0	8.1	1.9	0
Both government & native	14.2	12.4	18.9	8.6
All other combinations	8.1	0	2.4	35.2
	100.0	100.0	100.0	100.0

Source: Colson (1971), pp. 232-34.

for more serious disorders was not because of cost or transportation problems. The clinic was apparently free and located in the village. Rather, villagers perceived the public clinic to be a source of treatment for minor symptoms only. Like many rural clinics, it was staffed by a nurse and other auxiliary personnel. A doctor visited once a week, road conditions permitting.

Data from the previously mentioned 1976-77 Afghanistan survey show a similar pattern of either using no practitioner or a variety of practitioners. Most of the 740 household members who were sick during the two weeks prior to the survey started their convalescence with no treatment or with self-treatment. For those who sought care, the average number of different practitioners used was 1.55. Fifteen percent used three or more different services. Table 12 gives the frequency of use for each treatment. Because repeats are counted, the numbers sum to over 100 percent.

Other studies confirm the willingness of low income rural populations to experiment with the choice of treatments. A study in the urban area of Ibadan, Nigeria, found that 69.5 percent of the 506 sample households used native medicines either exclusively or at times. Yet 90.7 percent of these same households reported that at least one family member had been to a hospital (Maclean, 1966).

Another researcher tried to discover at what point in an illness episode people would seek care. Set in a rural area of Nigeria, this study found that even where a modern medical facility was convenient, half the parents would not use it at the onset of an illness in one of their children. If the first home treatment failed, then nearly all of the parents would take the child to a modern facility if it were nearby. Where the facility was distant, however, only about half the parents would

TABLE 12. Frequency of Use of Sources of Treatment of Illness in Last Two Weeks--Afghanistan, 1976-77

Treatment Used	Frequency of Use (%)
No treatment	33.0
Home treatment	58.8
Basic health center	25.4
Private doctor (local)	12.9
Hospital (regional)	12.5
Private doctor (regional)	9.6
Pharmacy	9.0
Bazaar	8.2
Private doctor (Kabul)	5.2
Mullah (village religious leader)	4.8
Dokhan (village source of drugs)	3.8
Hospital (Kabul)	2.4
Outside country	1.2

Source: Adapted from O'Connor (1980), p. 197.

undertake the journey. Most of those who would not travel would seek out a native doctor at this point (Orubuloye and Caldwell, 1975).

The data table 13 presents are from a study of illness behavior for 479 sick people in 24 villages of eastern Kenya. Attempts to cure a disorder were followed for up to four consecutive treatment efforts. By the time of the fourth effort, the sample was reduced from the original 479 ill individuals to 113 people who were still living and sick.

Visual inspection of the data suggests three important trends. First, use of the government hospital, the traditional healer, the private clinic, and self-treatment was fairly low and stable across the four treatment efforts, although the percentages reported conceal whether the stability of this usage pattern was the result of repeat visits by the same person or because of practitioner mixing by different people. Second, use of the government health center and the retail shop dropped off precipitously after the initial treatment effort, while use of the mission clinic peaked with the second visit and gradually dropped off thereafter. At no point, though, did the mission clinic account for less than a fifth of all the treatment strategies undertaken. The third and clearest trend was the extent to which people apparently gave up on using any practitioners as their diseases progressed. Initially, 6.1 percent of the sample did nothing, but by the fourth effort this response was made by 44.2 percent of the sample. Mwabu (1982, p. 5) enumerates the following reasons, in the order of importance, for doing nothing: ". . . waiting to see the effect of previous treatment, undecided about the next provider to visit, no money for further treatment, no one to leave home or at the farm, gave up seeking further treatment." Thus the high response rate for doing nothing in the fourth round may have been a misleading artifact of the survey method used,

TABLE 13. Illness Behavior in Percentages--Kenya

Treatment Source	Progress of Treatment Efforts			
	1st	2nd	3rd	4th
Government health center or dispensary	28.6	20.3	13.2	11.5
Government hospital	2.9	5.0	6.8	5.3
Traditional healer	6.5	5.6	6.3	8.9
Retail shop	26.3	10.9	9.5	3.5
Mission clinic	19.8	31.6	24.7	20.4
Private clinic	3.9	5.4	9.4	3.5
Nothing	6.1	17.5	26.3	44.2
Self-treatment	5.9	3.7	3.7	2.7
	100%	100%	100%	100%
	(N = 479)	(N = 320)	(N = 190)	(N = 113)

Source: Adapted from Mwabu (1982), tables 1 and 2, pp. 3-4.

in that it contains many people who, conditions permitting, would probably have sought additional help later.

Mwabu also calculated conditional probabilities to describe how services were mixed in the first two treatment efforts. He tried to answer the question, Given that we know what treatment source was used in the first effort, what was the probability of using each particular type of service in the second effort? In general, this procedure demonstrated that there was almost no loyalty to any practitioner except to the mission clinic (there was a 41 percent probability of returning there during the second round), that the mission clinic was popular for follow-up care no matter what strategy was pursued in the first round, and that over half the probability of using no care in the second round was accounted for by those using a retail shop or self-treatment in the first round (suggesting that this behavior was either because of income and cost considerations or the mildness of the illness).[5]

It is probably unwise to compare the Colson, Afghanistan, and Mwabu data since the surveys are so different. Yet the relative use of modern and traditional sources of care is surprisingly consistent for the three surveys, despite inevitable and substantial differences in access for the three countries involved. In every case, self-treatment and no treatment appear to be important alternatives to seeking professional help, and the Colson (Malay) data identifies the close association of this phenomenon with the gravity of the illness. The abandonment of governmental services in favor of traditional ones for serious illnesses is demonstrated by Colson but cannot be detected in the Afghanistan data as presented. However, at least the first half of this proposition, the retreat from the government dispensary, is confirmed for prolonged illnesses by Mwabu's

Kenyan sample.

The preference for traditional healers when illnesses fail to respond to treatment (and thus are perceived to be serious) has also been observed in the highlands and lowlands of Guatemala (Cosminsky, 1972; Cosminsky and Scrimshaw, 1980). Cosminsky theorizes that this pattern may reflect an increasing sense of desperation, or willingness to take a "shotgun" approach as an illness proceeds without improvement. Moreover, she suggests that most people have come to expect quick relief from modern medicine; so when prompt relief is not forthcoming, the patient may sense failure and change to the traditional healer.

Cosminsky also considers another determinant of this behavior to be rooted in the realm of etiological beliefs. As the illness is perceived to be more serious and tenacious, the question of "Why me?" becomes relevant: not only "What sickness do I have?" but "Why?" The answer to that question of ultimate causation often lies in the supernatural and moral domains of local belief systems. As such, it can be addressed by the traditional healer and cannot be answered meaningfully by the modern medical system. The traditional healer may attribute the origin of the illness to such causes as punishment for a broken taboo, witchcraft, or a family social conflict (Cosminsky, 1977b; Heggenhougen, 1980).

Conclusions--Supply of Practitioners and Use Patterns for Curative Care

It is essential to be conservative in drawing conclusions from such a disparate set of sources and the simple frequency tabulations available from the literature reviewed in this section. Nevertheless, there are some unmistakable themes that can be viewed either a conclusions or as

hypotheses for future work. They include the following:

1. Traditional medical practitioners constitute a vigorous and rapidly changing component of the health care delivery systems of all low income countries. In many cases they have adapted to competition from modern scientific medicine by adopting some of its practices and symbols. Whether or not governments engage in formal efforts to supplement the training and tools of traditional healers, these practitioners will continue to use informal channels, such as the pharmaceutical industry, to preserve their positions in the medical market.
2. The use of traditional practitioners must be assumed to have a rational basis. They clearly satisfy economic, psychological, and social needs of their patients and have long been recognized to treat at least some types of medical disorders effectively. Exactly the same statement could be made about modern medicine. In each situation reviewed here in which modern care was available, often with no cash cost, a significant number of people opted to pay for traditional care.
3. A related point is the difference in perceptions between planners and patients. The introduction of modern medical installations is usually undertaken on the assumption that they will be filling medical service vacuums. No such vacuums exist, however, since in every community there are well-established patterns of health-related behavior. New medical services are simply used as another alternative in what appears in most cases to be a pragmatic and unprejudiced search for a cure.
4. Although quality is never explicitly mentioned in any of the studies cited in this section, it is tempting to deduce from the evidence

that the perceived quality of competing practitioners plays a major role in treatment decisions, especially for serious illnesses. If true, this implies that the ability to maintain high quality staffs and supplies at government facilities should be determining factors in whether they are built. This is in contrast to the current emphasis on the construction of facilities, which is caused in part by the availability of international aid for capital expenses. It is even possible that the marginal improvement in the effectiveness of health care delivery systems (when patient behavior is taken into account) would be greater for money spent on improving the quality of existing practitioners than for money spent on infusions of low quality modern practitioners. This is an area that requires more study.

5. The provision of limited-function health substations in rural areas is often undertaken on the assumption that they will at least provide some care to the local population and will act as a referral agency to larger institutions for cases beyond the competence or resources of local personnel. The hope for an effective referral network, however, is probably a mistake, since being told to go to a city hospital makes it no cheaper or easier for a rural individual to get there than it was before the referral was made. Moreover, for seriously ill people, this advice would hardly seem necessary, since they eventually seem to try every available source of care. Mwabu found that there was only a 6 percent chance of using the government hospital on the second effort if the first visit was to the government clinic. The hospital was 40 miles away (Mwabu, 1982).

6. The hypothesis is confirmed that people will pursue self-treatment at least until it becomes obvious that the illness is not likely to

respond. Given the existence in many countries of a large network of pharmacies and retail shops that sell drugs and give medical advice, this network may be an important point of intervention for improving the effectiveness of initial treatment efforts taken in the home. More to the point, home treatment probably involves the use of drugs that have been left over from previous illnesses and over-the-counter drugs kept in the home. As Wiese observed in Haiti, "A Western drug is frequently considered effective against any complaint. As a result, much of the oral medication dispensed is not used by the appointed patient for the specific disease, but rather is dispensed to a wide range of family and friends for an even wider range of disorders." (Wiese, 1974, p. 360) Thus, an effort to transform pharmacies into a source of high quality information about diseases and treatment strategies might lead to a considerable improvement in the home management of medical problems (Heggenhougen, 1980).

The following section examines the issue of mother and child health services in much the same way that curative care has been examined above.

CARE OF MOTHERS AND CHILDREN

Mothers and children constitute approximately two-thirds of the population of low income countires. Maternal mortality rates in these countries are extremely high relative to the rates in high income countries. The average in 1975 for 21 low income countries that reported this statistic was 102.61 maternal deaths per 100,000 live births (WHO, 1980b).[6] Rates of over 1,000 have been reported for some regions of Africa (WHO, 1980a). These numbers

can be compared to 1975 rates of 12.8 for the United States and 1.9 for Sweden (WHO, 1980b). Thus, Third World mothers face a high level of risk during the birth process, but newborns are in even greater danger. Infant mortality rates approaching 200 per 1,000 live births are not unusual (compared to 16 per 1,000 in the United States and 8 per 1,000 in Sweden).

It appears that life expectancy in these countries could be improved considerably simply by making the birth process safer (Golladay, 1980; Preston, 1976). It has been estimated that 11 years of life expectancy is lost in low income countries by high-risk individuals because of problems of childbirth, infectious diseases, diarrheal diseases, and parasitic diseases in the first year of life (Preston, 1976). Similarly, by comparing the causes of death in countries characterized by long life expectancies with the causes of death in countries which have short life expectancies, it can be shown that reductions in maternal mortality for the age group 25-39 account for nearly 11 percent of the longer life expectancy for women in high income countries (Preston, 1976). Thus it is not surprising that improving obstetrical and infant care is a major goal of the rural health delivery systems in most Third World countries.

The birth process is so bound up in long standing family habits and cultural traditions, however, that this goal may be an extremely difficult one to achieve. This is so despite the apparent simplicity of many of the remedies. A large percentage of existing infant and maternal deaths could be avoided by simple forms of care prior to delivery (especially in cases involving poor nutrition and predictable complications of delivery), slight changes in obstetrical practices to avoid neonatal tetanus, simple antidehydration techniques for diarrheal infants, and vaccinations against common diseases of childhood.

In addition, a number of technical problems complicate what appears to be a straightforward need to modernize the birth process. First, there is the problem of measurement. It is extremely difficult to measure the effects of improvements in health care delivery systems on morbidity and mortality statistics. The reasons include the following: the difficulty of accurately measuring morbidity, the huge sample size needed to obtain a reasonably large sample of deaths, the high cost of collecting accurate mortality records in low income countries, and the near impossibility of isolating the effects of marginal medical care improvements from those of other determinants of health (nutrition, weather, economic development, education, etc.).

Because the childbearing experience is not a physical disorder, but to the contrary, a normal biological process, the effect of infusions of modern care on changing the outcome of pregnancies can be quite marginal indeed when aggregate measures are used. For instance, even where there are 1,000 maternal deaths per 100,000 live births, there is still only a 1 percent chance that any particular mother will die. Halving the number of maternal deaths would be a tremendous improvement in absolute terms, and it would have a large impact on the life expectancy of the mothers in question. Nevertheless, it would change the outcome of only .5 percent of all deliveries. In other words, there is a high probability that any particular delivery, whether attended by modern or traditional practitioners or not--or most simply put, whether involving any medical attention at all--will end successfully for both the mother and the child.

Thus, trying to measure the effect of changes in the supply of medical services to pregnant women is an almost hopeless task.

Second, there is the problem of focus. Making the birth process more modern has no direct effect on the incidence of malnutrition or respiratory

and diarrheal diseases in the first year of life, which are probably much more lethal to infants than the actual process of birth. For example, in the Bohol, Philippines, demonstration project cited later in this section, 16 percent of 664 infant deaths reported for five municipalities from 1976-79 were caused by prematurity or neonatal tetanus. These are two conditions which might be preventable using modern prenatal and obstetrical practices. However, respiratory diseases, including pneumonia, bronchitis, and broncho-pneumonia, were reported as the cause of death for 33 percent of the infants and 42 percent of 417 child deaths (ages 1-4). Another 12 percent of the infants and 22 percent of the older children died from "fever, cause unknown" and gastroenteritis. Susceptibility to these diseases is heightened by malnutriiton. In early 1979, 29 percent of the children (ages 0-6) in these same municipalities scored less than 75 percent on the Filipino weight-for age scale, thus being classified as cases of second or third-degree malnutrition (Williamson, 1982).

Accordingly, while the emphasis on avoiding deaths of mothers and infants during delivery is well placed (simply because so many are easily preventable), it cannot be expected that in percentage terms, this will have any substantial impact on aggregative mortality statistics. It is not by any means obvious, moreover, that modernizing the birth process will affect the deaths of even a quarter of the infants who die in the first year of life. Finally, the birth process probably need not take place in a hospital, nor do deliveries require attendance by expensively trained personnel, in order to allow low income areas to participate in the safer conditions afforded by some modern practices.

These facts about the birth process are recognized by most low income countries, where efforts are often centered around training traditional

and modern midwives, but that effort does not show up in the type of coverage statistics that are available. The statistics tend to report the percentage of home versus clinic/hospital deliveries and the percentage of traditional versus modern attendances. In light of this discussion, these types of statistics probably have little meaning in assessing the safety of the birth process (which is the point of the numbers, presumably), but they tend to be all that is available so are reported in the following three sections for modern prenatal, obstetrical, and well-baby programs. More relevant statistics are reported, and patterns of use are examined, in cases where data permit.

Prenatal Care

A study of 180 low cost health projects in 54 countries found that more than 90 percent offered some kind of maternal health services (American Public Health Association, 1977), yet the data in table 14 indicate that a significant proportion of the pregnant women in low income countries receive no prenatal supervision from modern sources.

A typical regime of antenatal care would include an initial visit when the woman first senses that she is pregnant, additional monthly visits up to the 28th week, and fortnightly visits thereafter until delivery (King, 1966). An uncomplicated pregnancy would thereby call for 10-12 prenatal visits, although it must be noted that there is considerable controversy on the necessity for so much medical attention. Table 15 gives frequencies for selected countries by the number of visits, income class, and residence.

Tables 14 and 15 indicate that the coverage of prenatal clinics is highly variable across countries but that they often reach fewer than half

TABLE 14. Prenatal Supervision: Percentage of Pregnant Women Seen in Modern Clinics or Hospitals--Selected Countries, 1965-77

Area, Country, & Date	%
LATIN AMERICA	
Brazil (1979)	59[1] (rural)
	76 (urban)
Dominican Republic (1970)	30[2]
Honduras	25[3] (in maternal & child health clinics only)
Jamaica (1979)	91[1] (rural)
	91 (urban)
Nicaragua (1977)	16[4] (rural)
	71[5] (Managua)
Panama (1965)	40[6]
AFRICA	
Botswana	70-80[7]
Kenya	15[8]
Swaziland	68[7]
Tanzania (1961)	33[9]
(1970)	67
Tunisia (1971)	30[10] (general; in maternal & child health clinics only)
	3 (rural)
	50 (urban)
Zaire	75[11]
MIDDLE EAST	
Jordan (1975)	35[12]
EUROPE (for comparison)	
Hungary (1975-78)	100[13]
Sweden (1975-78)	100[13]

Sources:
1. Morris et al. (1981), p. M-188.
2. Lashman and Daly (1974).
3. Woolley et al. (1972e).
4. Heiby (1981), p. 515.
5. Behrman and Wolfe (1979), p. 15.

Continued

TABLE 14. Continued

Sources:
6. Woolley et al. (1972b).
7. Pielemeier (1975).
8. Russell (1972).
9. Gish (1974), p. 151.
10. Beamer and Anderson (1975).
11. Lashman (1975).
12. Gallivan (1977).
13. WHO (1981).

TABLE 15. Percentage of Mothers Who Attended Prenatal Clinics by Number of Visits--Selected Countries

Country	Group[1]	No. of Visits (%)					
		0	1-3	4-9	10 or more	At Least 1	Mean No.[2]
Chile	Economically Advantaged	0	1	69	30	100	7.51
	Urban Poor	5	6	72	17	95	6.50
	Rural	9	7	70	13	91	5.99
Ethiopia	Economically Advantaged	1	5	30	63	99	8.35
	Urban Poor	29	16	41	13	71	4.29
	Rural	88	10	2	0	12	.33
Guatemala	Economically Advantaged	0	1	13	86	100	9.47
	Urban Poor	28	16	51	5	72	4.14
	Rural	34	29	35	2	66	3.06
India	Economically Advantaged	1	4	34	61	97	8.39
	Urban Middle Income	7	35	43	4	93	3.90
	Urban Poor	46	27	24	2	54	2.30
	Rural	56	33	10	0	44	1.31
Nigeria	Economically Advantaged	0	0	18	81	100	9.27
	Urban Middle Income	2	1	39	58	98	8.36
	Urban Poor	8	5	64	23	92	6.56
	Rural	15	3	26	56	85	7.35
Philippines	Economically Advantaged	1	4	34	61	99	8.39
	Urban Poor	17	35	43	4	83	3.90
	Rural	11	39	40	10	89	3.60

Continued

TABLE 15. Continued

Country	Group[1]	No. of Visits (%)					
		0	1-3	4-9	10 or more	At Least 1	Mean No.[2]
Zaire	Economically Advantaged	4	53	41	1	96	3.83
	Urban Poor	12	60	26	1	88	2.99
	Rural	13	63	23	1	87	2.86

Notes: 1. No definition is given for "Economically Advantaged," "Urban Poor," and "Rural."
2. This column is an approximate calculation using the grouped data presented in the table. The numbers 2, 6.5, and 10 are arbitrarily used as the mean number of visits for each of the three categories, 1-3 visits, 4-9 visits, 10 or more visits, respectively.

Source: WHO (1981).

the pregnant women. Table 15 suggests that "economically advantaged" groups consume a high level of prenatal care that compares favorably to the standard King recommends. Lower income groups seem to have high rates of contact with prenatal clinics, but they make significantly fewer visits, on the average, than high income groups. In every case, rural mothers are less likely than urban mothers to receive any care. Those who do, make fewer visits (on the average) than the urban poor.

By way of comparison, studies in the United States have found almost complete coverage of prenatal services. Less than 1 percent of 1,433 upstate New York women received no care (Yankauer et al., 1958), and only 1.2 percent of a Cambridge, Massachusetts, sample made fewer than three prenatal visits (Schonfield et al., 1962). In England, 1978 data show that .5 percent of delivering mothers received no care or made fewer than three visits. The average number of visits was over ten for all women using prenatal services (Oakley, 1982).

Less detailed data than that table 15 presents is available for several countries. In Malaysia, for women who delivered during the 12 months previous to the survey, an average of 3.48 prenatal visits had been made (Heller, 1976). The 589 pregnant or postpartum Filipino women in the Bicol Multipurpose Survey in 1978 had an average of 2.05 prenatal visits, but only 55 percent of them had received any prenatal care (Popkin and Roco, 1979). These figures differ substantially from the World Health Organization data for the Philippines in table 15. In Tanzania, there were an average of 3.8 visits; this did not change from 1961 to 1970 (Gish, 1975).

There is negligible evidence of patterns for using prenatal care in the Third World; in this instance, the only choice allowed by most surveys is between private and public sources of modern medicine. Traditional

practitioners are typically assumed not to offer preventive care. This is an error, of course, since traditional midwives provide prenatal care which may involve massages, herbal baths, herbal medicines, teas, dietary recommendations, behavioral restrictions, rituals, and the maintenance of a hot-cold balance of the body through "proper" diet and activity. Although these precautions may be based on different assumptions from those of modern preventive medicine, they are aimed at preventing complications and facilitating the birth and thus should be considered as preventive medicine. As mentioned above, 93 percent of the hilots surveyed in the Bicol Region of the Philippines claimed to offer prenatal care. By expanding the definition of prenatal care to include that supplied from traditional sources, it could probably be claimed that virtually 100 percent of pregnant mothers receive prenatal care of one form or another.

Table 16 shows the sources of modern care in three countries for women making prenatal visits.

The pattern is fairly consistent for all three of these countries, with use of public sources accounting for no less than two-thirds of all visits. For Brazil and Jamaica, the urban and rural usage patterns are quite similar.

Data are also available from a maternal and child health demonstration project conducted in the Bohol Region of the Philippines--a rural area characterized by small settlements and scattered households engaged in subsistence fishing and farming. It is located 350 miles south of Manila. The project trained midwives to identify mothers and children and offer them care. In addition, a control area outside the project was surveyed to assess the effectiveness of the demonstration effort. These results are of general interest in evaluating the effects of this type of

TABLE 16. Sources of Prenatal Care for Women Making Modern Prenatal Visits in Percentages--Brazil, Jamaica, Philippines

Provider	Philippines[2]	Brazil[3]		Jamaica[3]	
		Urban	Rural	Urban	Rural
Private clinic or hospital	23	12	6	11	16
Public clinic or hospital	68[4]	85	90	89	81
Other[1]	9	3	3	1	3
	100% (N=311)	100% (N=491)	99% (N=415)	101% (N=412)	100% (N=736)

Sources:
1. Includes home visit (practitioner unknown but quite possibly traditional, at least for the Philippines).
2. Popkin and Roco (1979).
3. Morris et al. (1981), p. M-188.
4. Includes puericulture centers--semipublic health centers.

program and are of specific interest here because of the detailed analysis of prenatal practices. See table 17.

Although the average number of prenatal visits did not increase significantly over the two and a half years of the project, the effort to educate mothers about good obstetrical practices and to identify problem cases during the prenatal visits, clearly paid off. The women were seen earlier in their pregnancies, many more received tetanus toxoid (to prevent neonatal tetanus), and a much larger percentage of problem pregnancies were identified. It was disturbing to the project sponsors, however, to find that there was no clear decline in infant and child mortality rates over the life of the project, notwithstanding the success achieved in changing the existing patterns of prenatal care (Williamson, 1982). The failure to measure any impact for the program was probably because of the statistical problems examined in the introduction to this section.

Obstetrical Care

The effectiveness of modern techniques in avoiding delivery-related deaths can be shown by evidence from specific projects, although the caveats expressed in the introduction to this section should be kept in mind. For the project in the Bohol province of the Philippines, the proportion of hilots (traditional midwives) having received training increased from 60 percent in 1976 to 89 percent in 1979; the number of births attended by untrained midwives fell from 67 percent to 1 percent. The number of cases of tetanus neonatorum fell from 26 to a projected 2 cases over the same period. This improvement was probably due almost entirely to more hygenic delivery techniques and the use of tetanus toxoid (Prado, 1979).

TABLE 17. Maternal and Child Health Service Coverage--Bohol, Philippines

	Project Area		Nonproject Area	
	"Before" (early 1976)	"After" (late 1978)	"Before" (early 1976)	"After" (late 1978)
% of women consulting medical staff during pregnancy	68	85	58	67
% of women consulting only TBA's* during pregnancy	28	12	36	28
% of pregnant women waiting until 3rd trimester before prenatal care	27	10	19	22
Mean no. of prenatal visits by pregnant women	3.4	3.8	3.4	3.4
% of pregnant women getting 2 doses of tetanus toxoid	40*** (early 1977)	60*** (late 1979)	NA	NA
% of women with problem pregnancy who consulted a midwife	2	45	0	11
% of women who used bamboo sliver to cut umbilical cord (at last live birth)**	18	6	23	21
% of women receiving family planning advice during last pregnancy	61	86	64	77

Notes: * Traditional birth attendants.
** The traditional Filipino method for severing the umbilical cord.
*** A few municipalities did not administer tetanus toxoid because the local health staff felt there was no longer enough risk of neonatal tetanus to justify the procedure.
NA = not available.

Source: Williamson, 1982, p. 108.

Table 18 compares certain infant death rates for Luvale children delivered in the traditional manner (at home) in a village in Zambia with those for children from the same village delivered at a nearby mission hospital. In total, the rate of fetal deaths was approximately twice as high for village parturients as for hospital parturients (31 percent versus 15 percent). Many of the hospital cases were complications that had begun as village parturitions; so the actual safety of hospital births is probably understated (Spring, 1980).

This limited information gives an idea of the potential of modern techniques for reducing the risk of fatal deliveries. Table 19 collects data from a number of sources to examine the relative availability of these techniques in low income countries. While this is not intended as a picture of the relative safety of births in these countries (since that is also affected by environmental conditions and the safety of traditional techniques), it does indicate the relative success of different countries in altering traditional patterns of birth-related behavior.

As in previous tables of this type, the evidence suggests a large amount of variability in coverage, both by country and region. For all countries presented, however, modern practitioners attended, on the average, less than half the total births. In the cases where rural statistics were available, the coverage was much lower.

Somewhat more detailed analysis of professional attendance at births is available for a few countries. The Managua, Nicaragua, sample indicated almost complete coverage in that city; 91 percent of the births were attended. Of these, 73 percent were attended by a physician or took place in a hospital (or both), and 18 percent were attended by a trained midwife or a nurse (Behrman and Wolfe, 1979). In the Malaysian sample, 76 percent

TABLE 18. Percentages of Fetal and Infant Deaths in Village and Hospital Parturients Among the Luvale--Zambia

	Village Parturients			Hospital Parturients		
Age Group	15-29	30-44	45+	15-29	20-44	45+
Miscarriages & stillbirths	16.1	26.5	20.1	11.8	10.9	7.1
Deaths for infants up to age 1	33.3	23.5	20.1	8.3	8.5	17.9

Note: For hospital parturients, deaths for infants up to age one may be understated because the sample included children still in that age group.

Source: Spring, 1980, p. 68.

TABLE 19. Births Attended by Modern Practitioners (Physicians, Nurses, Trained Midwives)--Selected Countries, 1969-76

Area, Country, & Date	% of All Births
LATIN AMERICA	
Bolivia (1971)[1]	18
Brazil	75 (urban) 42 (rural)
Dominican Republic[3]	33 (hospital or clinic)
El Salvador (1969)[4]	27 (hospital or clinic)
Guatemala (1970)[1]	25
Honduras[5]	20 (hospital only)
Jamaica (1975)[6]	75
Nicaragua	91 (urban)
Panama	61 (1965)[8] 69 (1972)[1]
Paraquay (1972)[1]	55
Peru (1971)[1]	15 (hospital only)
Venezuela (1972)[1]	62
AFRICA	
Botswana (1973)[9]	43
Libya (1972)[1]	52
Lesotho (1972)[9] (1973)[9]	25 (urban) 5 (rural)
Madagascar (1971)[1]	71
Sudan (1971)[1]	10
Swaziland[9]	25 (hospital only)
Tanzania[10]	10 (1961) 33 (1970) (institutional confinements)
ASIA	
Afghanistan[11]	5
Iraq (1971)[1]	28
Jordan (1975)[12]	4
Malaysia (1976)[13]	76

Continued

TABLE 19. Continued

Area, Country, & Date	% of All Births
ASIA	
Pakistan[14]	5
Philippines (1971)[15]	54 (general) 25 (3 rural provinces)
Singapore (1972)[1]	88
Sri Lanka (1972)[1]	95
Syria (1975)[16]	60
Thailand (1973)[17]	20
Vietnam (1972)[1]	81
OTHER	
France (1971)[1]	100 (97 in hospital, 3 at home)
Poland (1972)[1]	100

Sources:
1. Golladay (1980), p. 84.
2. Morris et al. (1981).
3. Lashman and Daly (1974).
4. Woolley et al. (1972c).
5. Woolley et al. (1972e).
6. Furnia (1977?).
7. Behrman and Wolfe (1979).
8. Woolley et al. (1972b).
9. Pielemeier (1975).
10. Gish (1975).
11. Furnia (1978).
12. Gallivan (1977).
13. Heller (1976), p. 136.
14. Furnia (1976).
15. del Mundo et al. (1974).
16. Weissman (1977b).
17. Woolley (1974).

of the births were attended, but in this case only 29 percent were attended by a physician. Forty-six percent of the Malaysian births took place in a hospital (Heller, 1976). The rural Philippines data imply a different structure (see table 20).

Almost all Filipino births took place at home and were attended by either a traditional midwife or a modern trained midwife. Only 6.5 percent of the births took place in a hospital or were attended by a doctor. A similar situation exists in rural Afghanistan, where in 1980 it was estimated that 75 percent of the births were attended in the home by traditional midwives (dai), and 15 percent by female household members. Only 10 percent were attended by modern practitioners, either at home or at a medical facility (O'Connor, 1980).

In Brazil, there are data for both urban and rural women in Piaui State. Table 21 shows the differing urban and rural patterns. About 75 percent of the urban women gave birth in a hospital, a rate almost identical to the percentage in Managua. Approximately 33 percent fewer women in the interior used a hospital. A majority of the rural women (54 percent) gave birth at home. Despite the high rates of hospitalization in the city, at least 20 percent of the urban sample also stayed home.

A study in two regions of rural Ghana found that only about 20 percent of all births were supervised by trained personnel, either in the home or a health unit. However, this rate was highly variable by locality. In a locale where the service areas of two health units overlapped, approximately 66 percent of all births were supervised. Another area in the same region, with less access to modern facilities, recorded only about 12 percent of the births as being supervised. What appears to be a supply-induced pattern, however, is confounded by the fact that about 80 percent

TABLE 20. Location of Delivery and Attendant--Rural Philippines, 1977

Place	% (N = 501)	Attendant	% (N = 493)
Home	91.6	Household member	2.4
Private clinic	1.2	Traditional midwife	63.1
Public clinic	.8	Modern midwife	27.8
Public hospital	3.0	Doctor	6.5
Private hospital	3.4	Nurse	.2
	100.0		100.0

Source: Popkin and Roco (1979).

TABLE 21. Place of Last Birth--Brazil, 1979

Place	% City of Teresina (N = 598)	% Interior (N = 672)
Public hospital or health center	69	41
Private hospital	6	1
Own home with midwife	17	48
Own home with other person	3	6
Other location	2	3
Unknown	2	1
	99%	100%

Source: Morris et al. (1981).

of mothers in both areas sought prenatal care. This may indicate a willingness to travel for prenatal care but to stay home for delivery; economic factors may be at work; or it may simply be another case of the pragmatic mixing of providers. The data are not adequate to answer such questions (de Kadt and Segall, 1981). It is interesting to note also that 55 percent of the Filipino sample received prenatal care; clearly a large proportion of these women also stayed home for delivery and a smaller proportion used a traditional midwife (Popkin and Roco, 1979). Similarly, in Jamaica, where over 90 percent of all women received prenatal care in 1979 (see table 14), half of the mothers delivered at home in 1974, half with an untrained midwife (Furnia, 1977).

A number of reasons have been offered for the continued use of home delivery with a traditional midwife even when the mother also uses prenatal clinics. These factors include the following:

1. Distance to the hospital or clinic and lack of transportation. Problems of timing and safe travel may be more critical when a woman starts labor than when she is pregnant and can walk more easily.
2. Confidence in the traditional midwife, who shares the mother's language, body concepts, and attitudes toward birth. The traditional midwife is also a familiar and known person (compared to a stranger in the hospital), and she often provides emotional as well as physical support for the woman.
3. Familiar environment at home with family and relatives, who provide social and emotional support and may decrease anxiety.
4. Loneliness, isolation, unfamiliarity and strangeness of the hospital. Identification of the hospital as a place one goes to die. This may increase the mother's anxiety and make for a more difficult birth.

5. Unwillingness to leave children, husband, and animals alone while in the hospital.
6. Female modesty and fears. This is also related to the age and sex of the doctor.
7. Preference to deliver in the kneeling or squatting traditional position. Most hospitals are promoting the horizontal or supine position.
8. Desire for massages by midwife during labor.
9. Concern about proper disposal of placenta and umbilical cord in societies where this is believed to affect the child's and/or mother's future health and welfare.
10. Desire for postpartum care which may include special diets, massages, herbal baths or sweatbath (parts of Latin America), binding of the abdomen, herbal teas, and rituals performed by the traditional midwife. The traditional midwife's service for postpartum care may be difficult to obtain if the baby is delivered in the hospital.
11. Condescending and discourteous treatment of midwives who do refer or bring in their clients for clinic or hospital care, as well as occasional discourteous treatment of the client.*

It can be concluded that a notable proportion of women throughout the Third World deliver their children at home and continue to use traditional sources of care--either family members or traditional midwives. Many countries have recognized this pattern and have instituted programs to train traditional midwives in modern practices. Some of these are reviewed elsewhere (Simpson-Hebert et al., 1980; World Health Organization, 1979).

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* Sheila Cosminsky, personal communication, April 20, 1982.

An issue related to antenatal care and birth attendance is the return of the mother to a clinic for postpartum care. Since pregnancy and delivery are usually accomplished without complication, it would not be surprising to find that most women in low income countries do not seek out postnatal care. The evidence, however, is negligible (see table 22). It is possible that the high urban Brazilian results and the high Jamaican return rate for both urban and rural areas are because of social security, social insurance, or aggressive mobile programs. This cannot be ascertained, however.

In addition to the results in table 22 note that traditional birth attendants almost universally make follow-up visits to the mother.

Well-Baby Care and Immunizations

The delivery of care to infants is emphasized by modern medical practice because the potential for prevention of many problems is so great at this stage. Mothers can be educated in sound nutritional practices, abnormalities can be detected early, and protection against infectious diseases can be provided to the baby. Well-baby care is heavily institutionalized in high income countries, to the extent that most newborns receive comprehensive care. In France, for instance, mothers are paid monthly allowances for each child, but the payments do not commence until the mother can prove that the child has been taken to a child health clinic (Roemer, 1977). This emphasis on prevention is continued during the first years of elementary school, at which point many public health programs check up on immunizations, provide eye examinations, and in some areas, institute dental care.

Many low income countries attempt to provide these types of services; given the enormously high levels of infant mortality and morbidity these

TABLE 22. Postpartum Care--Selected Countries

Country	Frequency
Nicaragua[1]	1.8% of those who received prenatal care
Tunisia[2]	3% of all women
Nicaragua (1977)[3]	10% of all women: one rural department
Brazil (1979)[4]	48% urban 27% rural
Jamaica (1979)[4]	71% urban 70% rural

Sources:
1. Holland et al. (1974).
2. Beamer and Anderson (1975).
3. Heiby (1981), p. 515.
4. Morris et al. (1981).

countries experience, the potential payoff for infant and child care is even higher than in high income countries. Very little information is available, however, on the coverage of these services or their use. Table 23 gives scattered statistics on the number of visits to child health centers for Latin America.

The numbers in table 23 probably overstate the number of infants making well-baby visits, because they may include repeat visits and because live births are probably underestimated. The Panama figure, for instance, clearly includes repeat visits. Other estimates for Panama indicate that 75 percent of children under age one are seen by medical personnel (Woolley et al. 1972b). Similar estimates place the proportion of under ones seen in Nicaragua and Honduras at 49 percent and 50 percent respectively (Holland et al., 1974; Woolley et al., 1972e). Notwithstanding these inevitable inaccuracies, it is clear that in no more than a third of the countries did the number of infant attendances exceed half of the live births in 1968. The situation may be much worse in lower income regions; the countries listed in table 23 are relatively well off.

In Swaziland, where per capita annual income was $260 in 1972, only 15 percent of children under five (not under one) were seen in clinics (Peilemeier, 1975). In Afghanistan, 50 percent of all deaths occur in children under five, but this age group accounted for only 17 percent of the visits to a sample of nine village health workers (O'Connor, 1980). In the rural Philippines, the Bicol data indicate that 40 percent of all births in 1977 were followed by well-baby visits, and that 77 percent of the visits took place at home. Since 80 percent of these home visits followed a home delivery by a traditional midwife, she probably was also responsible for the well-baby examination. The well-baby practitioner was

TABLE 23. Child Health Center Attendances--Latin America, 1968

Country	Infants (<1 year) Attending per 100 Live Births
Argentina	18.9
Dominican Republic	28
Ecuador	13.6
El Salvador	26.1
Guyana	83.6
Honduras	45.7
Nicaragua	33.5
Panama	140.2
Paraguay	65.5
Peru	57.9
Trinidad & Tobago	33.1
Uruguay	7.6

Source: Pan American Health Organization (1970).

not explicitly asked in the survey, so this is speculation (and is in conflict with the fact that only one hilot claimed to offer well-baby care). Approximately a third of hilot-attended deliveries were followed by a well-baby visit, 48 percent of trained midwife-attended deliveries involved well-baby visits, and 41 percent of physician-attended deliveries were followed by a well-baby visit (Popkin and Roco, 1979).

A related piece of information is the number of children receiving vaccinations. Nearly every low income country conducts mass immunization campaigns on a fairly regular basis. However, the data collected from these campaigns usually refer only to the number of doses administered, rather than to the percentage of the people injected. Thus, even though the numbers reported are often impressive, coverage may be very low if the same people are repeatedly being vaccinated or if the population is large. A specific problem in trying to vaccinate children through mass campaigns is that certain vaccinations (e.g., measles), depending on local practice, cannot be given if the child has diarrhea or is sick. This eliminates in advance a large number of children. At the same time, the sick children are probably not treated for their illnesses since only vaccinations are being administered. This is especially true for mobile clinics which do not carry many medications. Moreover, it would be difficult for the child to receive the vaccination later, when the illness subsides, because the vaccine is only available during the campaign. Consequently, the number of children reported as being vaccinated may not reflect the actual interest or demand, which is probably greater.*

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* Sheila Cosminsky, personal communication, April 20, 1982.

Moreover, few data on the geographic distribution and socioeconomic characteristics of those individuals immunized are available. In trying to ascertain which types of vaccinations have been administered to specific people, recall responses are extremely unreliable, yet the alternative--physical examination of the scars--gives incomplete information as to the type and number of actual injections. With these limitations in mind, it is still possible to draw broad conclusions from the data presented below.

A survey in East Java (Kardjati et al., 1977) found by physical examination that only one of six infants (N = 307) had been vaccinated against tuberculosis (BCG) and only one of four, against smallpox. However, of the children over age 15, over half (N = 5,158) had received a tuberculosis vaccination and nearly three-fourths had been vaccinated against smallpox. The Philippine data, based on recall, indicate that only 5 percent of the newborn babies in 1977 had received any vaccination. So few (only 2 of over 15,000 persons) adults could recall having been vaccinated themselves or having their other children vaccinated that this variable was not even [illegible] (Popkin and Roco, 1979). For effective disease control the WHO immunization standard is that 80 percent of the population must be vaccinated.

For specific immunization campaigns in which the percentages of people [illegible] were reported, we have the information in table 24.

Extensive information is available from a sample of 712 women in Ibadan, Nigeria, for whose children information on immunizations was obtained [illegible] interview and was partially checked against immunization cards or [illegible] of scars for accuracy. See table 25. The Ibadan data were broken down by residential area so that households could be identified by neighborhood class. See table 26.

TABLE 24. Vaccination Campaigns: Coverage Achieved in Percentages--Honduras, Jamaica, Jordan, and Nicaragua, 1967-70

Vaccination & Age	Country			
	Nicaragua[1] (1968-70)	Jordan[2]	Jamaica[3] (1967-69)	Honduras[4]
Smallpox (<5 yrs.)	4.8		33	
DPT (diptheria, pertussis, tetanus) (<5 yrs.)	14	<25	11	<40 (1st dose) <25 (2nd dose)
Poliomyelitis (<5 yrs.)	54.7	25	23	
BCG (tuberculosis) (<1 yr.)	28.2	13	10.5	

Sources: 1. Holland et al. (1974).
2. Gallivan (1977).
3. Furnia (1977
4. Woolley et al. (1972e).

TABLE 25. Vaccination Coverage in Percentages--Ibadan, Nigeria

Vaccination	% Children <5 with or without Immunization		
	Complete	Partial	None
BCG	46.7		53.3
Triple antigen	31.8	22.5	45.7
Polio	33.8	20.5	45.7
Smallpox	65.8		34.2
Measles	60.8		39.2

Source: Adekunle, 1978.

TABLE 26. Vaccination Coverage in Percentages by Class--Ibadan, Nigeria

Vaccination	Upper Class (30% of sample)	Working Class (33.9%)	Lower Class (36.1%)
BCG	70.2	45.1	33.3
Triple antigen	67.0	35.8	17
Polio	53.9	21.5	15.1
Smallpox	61.1	65.5	62.5
Measles	66.1	41.6	27.1

Source: Adekunle, 1978.

These results are from a city where there is a high level of coverage by physicians (1:1,500 people) and a large number of health facilities, including four public immunization centers. If 80 percent coverage is assumed necessary for disease control at the community level, even in this favorable climate protection had not been achieved in 1978, not even for the upper class. Still, the majority seem to be protected at least from smallpox.

About 18 percent of Jordanian infants get a full schedule of vaccinations (Gallivan, 1977). Syrian data for 1977 indicate that only 1 percent of the 1-4 age group and 7 percent of the 5-14 group had been vaccinated for tuberculosis. For the entire population above age five, fewer than five ten-thousandths had been vaccinated, yet Syria is a country where vaccinations are at least nominally cumpulsory in the schools (Weissman, 1977b). The Managua, Nicaragua, survey found that an average of 2.3 vaccinations (of the recommended six) had been administered to the infants in the sample (Behrman and Wolfe, 1979).

Conclusions--Mother and Child Care

Prenatal visits. It appears that rather than concentrating on the number of prenatal visits low income women make, the content and conduct of the visits actually made should be given careful thought. In the countries examined here, a surprisingly high proportion of women made at least one prenatal visit, but even the aggressive Bohol, Philippines, project found it difficult to increase the average number of visits. This situation probably calls for a conservative approach by health professionals. They should assume that the first contact a rural mother makes with them will also be the last during her pregnancy, and that she

will more than likely deliver her baby at home. If the mother's initial visit is treated as the only point of intervention that modern health professionals will make with her, then what happens during that visit should be quite different from what would have happened had ten more visits been anticipated (e.g., concentration on hygiene, nutrition, immunizations, tetanus shots, family planning, breastfeeding, etc. all at once).

Traditional midwives. A second point of intervention with the mother is, of course, the traditional midwife. It is much easier and cheaper to reach a midwife doing 20 deliveries a year than to reach each of the 20 mothers individually. Most countries have recognized this. The major problem with taking this route, however, is that the trainers have no control over whether the midwife actually adopts safer practices.

The experiences of anthropologists suggest that care should be taken to identify only those few dangerous practices which should be altered and to leave the rest of the traditional procedures intact. Trainers who ridicule the traditional customs, even to the point of insisting, for example, on the supine position for home deliveries, simply antagonize their students needlessly (Cosminsky, 1977a). Since a midwife's reputation is based on her safety record, her self-interest and the goals of trainers ought to coincide.

In addition, traditional birth attendants already perform prenatal and postpartum care. There has been some success in using them to identify problem pregnancies and motivate family planning (del Mundo et al., 1974).

Immunization. The evidence suggests that immunization coverage is so incomplete in most low income countries as to be ineffective as a disease control measure. The great potential for preventive care that immunizations could provide remains a virtually untapped health resource.

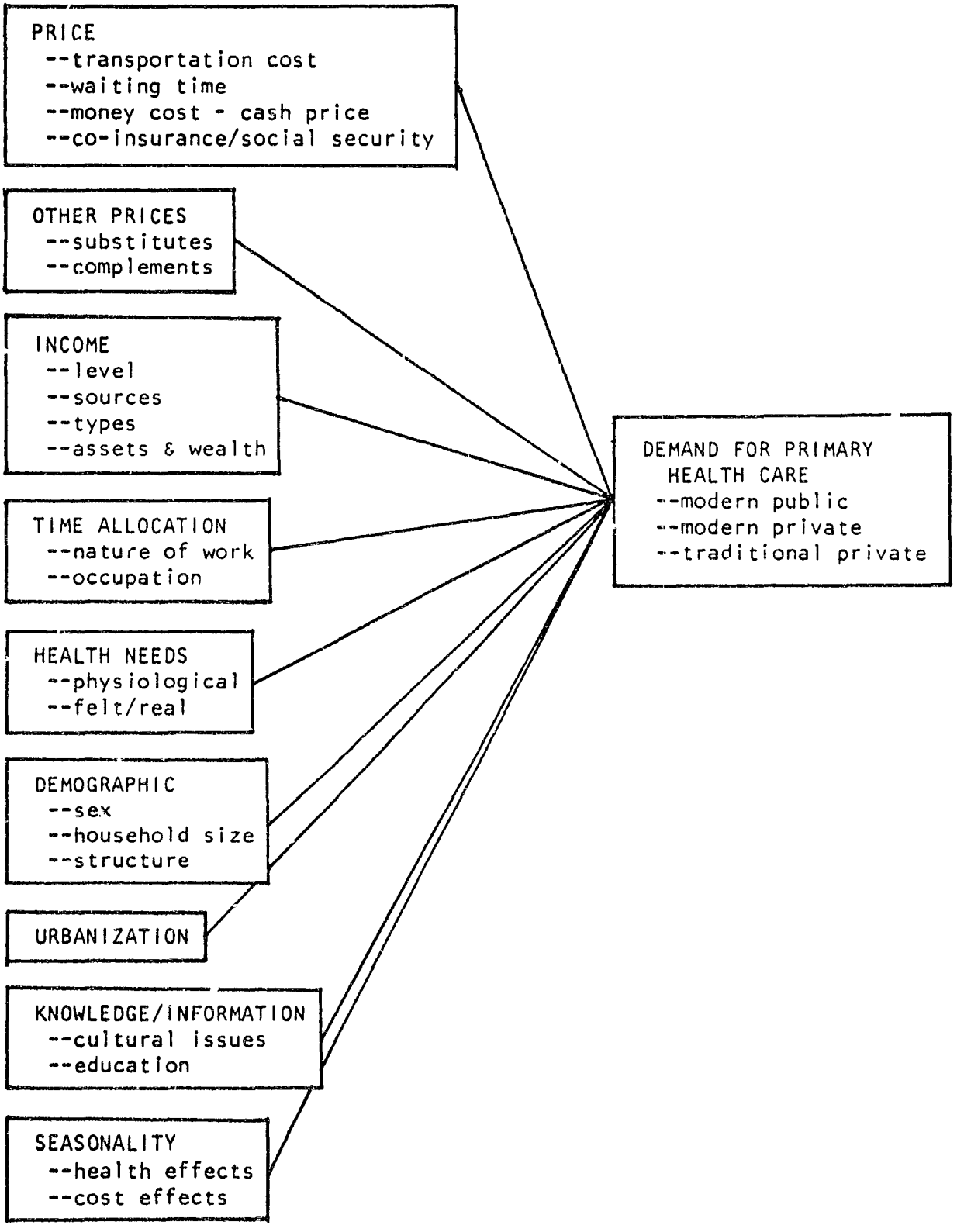
Chapter 3. DETERMINANTS

In this chapter we examine the economic, social, and behavioral factors which determine health service usage and choice of practitioner. The approach is general. Specific services (prenatal, outpatient curative, etc.) are singled out only as necessary. Figure 1 lays out the framework we use to organize the analysis.

PRICE

Economic theory identifies the relative prices of different goods as the fundamental determinant of how consumers will allocate household income among competing uses. Governments often provide modern medical services at no cost to the patient, so the allocative function of the price system is often purposely interfered with. Nevertheless, as the previous section shows, people continue to pay to use both traditional and modern private practitioners even where free public services are available. This mix of usage suggests that, other things equal, even though the price of government services may be zero, the opportunity cost[7] of using them is positive and must for some people be higher than that of more costly but less time-intensive alternatives. This hypothesis suggests the importance

FIGURE 1. Determinants of Demand for Health Services in Low Income Countries



of evaluating the actual cost of medical services in terms of the forgone alternatives instead of focusing exclusively on nominal, or reported, prices.

In this chapter we postulate that the opportunity cost of seeking medical care is approximated by the sum of the price paid to get to the medical installation, the price paid to use the service, and the price paid for any medicines required for treatment. These prices are thought of as having two components, a direct pecuniary cost, in terms of money, and an indirect (or nonpecuniary) cost, in terms of time. Thus the price to get to the medical installation includes both the cash outlay, if any, plus some valuation for the amount of time spent in transit. The price paid to use the medical service includes both the cash price for the service, if any, and a nonpecuniary cost for the amount of time spent waiting to be seen and being examined. Similarly, the cost of getting the required drugs includes both the cash price and an expenditure of time. In the following sections we examine each of these costs in detail.

Transportation Cost

A large proportion of the total bill for getting modern medical treatment in low income countries is transportation costs. A study of a district hospital in Uganda found that 75 percent of total outpatient cash outlays were for transportation. The total amount inpatients and outpatients spent for transportation exceeded half the hospital's annual operating budget (King, 1966).

Yet the cash price of a trip is a small part of the total real cost of transportation, since a large proportion of the trips undertaken in rural areas of low income countries involve no cash outlay at all. Travel is usually accomplished either by foot, bicycle, or beast of burden.

It is possible, for instance, to document the importance of walking as a means of transportation to health facilities. The previously mentioned survey of health facilities in a three-province rural region of the Philippines found that 44 percent of the public clinics, 37 percent of the private clinics, and 93 percent of the traditional healers were usually reached either by walking or by trips that included a combination of riding and walking. This was partially a supply-induced phenomenon, of course, since the ability to walk to a clinic is partially determined by its proximity to the patients' homes. In the Philippines case, 35 percent of the public clinics, 30 percent of the private clinics, and 90 percent of the traditional practitioners were within 1.5 km of the barangays served (Griffin et al., 1981). On the whole, however, 22 percent of the households surveyed in the 1978 Bicol Multipurpose Survey (which would have been households served by these facilities) reported walking as their primary means of transportation (Popkin and Roco, 1979).

In a facility-based study of health services in the Masaka District of the Buganda Region of Uganda, the transportation information in table 27 was collected for the government services. Generally speaking, in 1969 aid posts dispensed elementary outpatient care on an itinerant basis, dispensaries provided elementary inpatient and outpatient care, and health centers offered higher grade versions of the same services. The figures reported did not control for the type of patient (i.e., inpatient, outpatient, maternity, etc.); even so 65 percent of all patients walked. The average walking trip was three miles (Gershenberg and Haskell, 1972). Similarly, a study in Calabar, Nigeria, found that 62 percent of all patients walked and almost 67 percent of this urban sample incurred no direct out-of-pocket expenses for health-related trips. To receive baby care, women

TABLE 27. Means of Transport in Percentages by Type of Facility--Uganda, 1969

Facility	Walking	Bicycle	Bus	Taxi	Private Auto	Mean Distance (one way) in miles	Mean Travel Cost*
Aid posts	73	10	10	6	1	3.3	1.33
Dispensaries	58	12	14	16	0	5.1	1.35
Health centers	55	18	13	10	4	4.5	1.00
All facilities	65	12	12	10	1	4.1	1.29

Note: * Mean travel cost in shillings for one-way trip only for those who had expenses.

Source: Gershenberg and Haskell, 1972.

visiting the government family health center in Calabar not only had to take their child with them but also had to carry "such other articles as food and utensils" which the clinic required for child care (Gesler, 1979, p. 30). With an average trip length of 1.6 miles, walking for these women clearly represented a major investment of time and energy even though no cash payments were involved.

A methodological error is sometimes made in the literature because of a failure to recognize that those who walk incur a cost in getting to a health center. In the Calabar study, Gesler (1979) suggests that the amount of cash paid for transportation was an indicator of the level of effort individuals were willing to expend to get care. Consequently, he found individuals with high socio-economic status tended to put out more effort to seek health care, ignoring the fact that these were simply the people who could afford not to walk.

Another problem in interpreting transportation cost data is that the results often appear to be nonsensical. The travel cost figures in table 27 indicate a mean round trip cost of 2.65 shillings for patients using an aid station, 2.70 shillings for a dispensary and 2 shillings for a health center. This indicates that patients were willing to pay about a third more, on the average, to get to a low quality aid station or dispensary than to get to a higher quality health center. It may simply have been cheaper for the patients who used health centers to get to them because health centers had usually been built on busy roads in central areas, whereas the lower quality subcenters had been located in areas of low population density with poor transportation facilities (Gershenberg and Haskell, 1972). If the time costs had been included for these trips, the results would probably have been even more misleading.[8]

It is quite likely that in areas where transportation facilities are not uniformly good (the usual case in low income countries), transportation cost and distance to facilities are not linearly related. A short trip in the countryside may cost significantly more than a much longer trip in a built-up area. Similarly, there may be quite different relationships between trip time and distance for different areas of a country. Thus the preoccupation of planners with distance to health facilities may actually involve attention to an inappropriate proxy for the true items of interest--transport cost and transport time. There is a one-to-one relationship among these variables only if everyone uses exactly the same mode of transportation, such as walking at exactly the same speed. Reducing the distance to health facilties is, moreover, not the only way to reduce trip time and transportation costs. As stated earlier, the economic "distance" to facilities can be reduced by improving roads or providing new forms of transportation.

Nevertheless, distance has been the most-studied deterrent to health facility use. The usual hypothesis is of a nonlinear, downward-sloping relationship between distance and use. The more distant a facility is from a population, the less likely that group is to use it. Most patients who use outpatient facilities do not travel very far to get to them.

In Tanzania, for example, 50 percent of the outpatients at a government hospital and 37 percent at a private hospital traveled less than nine miles. They traveled even shorter distances to get to lower quality health centers, with 80 percent of health center patients traveling less than nine miles. Where there was a choice of a public or a mission hospital, three-fourths of the patients used the hospital nearest to their home, whether it charged fees or not, and notwithstanding the religious affiliation (van

Etten, 1972). Another Tanzanian survey found that over 50 percent of a health center's patients came from within five miles of the health center and another 30 percent came from five to ten miles away (Gish, 1975).

In Afghanistan 90 percent of village health workers' patients traveled less than 30 minutes, on foot, to seek care. Forty percent walked less than five minutes (O'Connor, 1980). The previously mentioned 1970 survey in Thailand found that 81 percent of the users of first class health centers and 97 percent of the patients at second class health centers traveled less than 3.5 miles (Woolley, 1974). A study in an Indian village found that 80 percent of the households there had used the local health center in the previous year, but that only 4 percent of those living in adjoining villages had visited the same clinic. Fully 53 percent of these villagers cited transportation problems as the reason for not using the health center (Ram and Datta, 1976). Although none of the studies cited above controlled for other factors that affect usage, they do supply consistent evidence of the importance of distance as a deterrent to use, or, put in economic terms, as a component of the cost of using a health service.

A few studies have used travel time or distance as a measure of the nonpecuniary cost of using medical services. In examining the demand for governmental and private health services in West Malaysia, Heller (1976) found the average cash outlay for a government visit to be 19¢ (U.S.) and for a private visit, $2.30 (U.S.). The average travel time to a government clinic was about 23 minutes and to a private clinic, about 29 minutes. Thus as a percentage of the total cost, travel time to a government clinic dwarfed the cost of travelling to a private clinic, which is exactly the expectation when the cash cost of the government clinic is so low. Put another way, since the cash cost of using the government clinic was almost

zero, the value of the time spent getting there accounted for almost 100 percent of the cost of the visit. On the other hand, a visit to a private clinic was already relatively expensive; so the cost of getting there constituted a much smaller fraction of the total cost of using the clinic. Consequently, it would be expected that patients at free government clinics would be measurably more sensitive to the time cost of transportation than private patients would be.

Heller failed to consider the treatment choices as a simultaneous system of demand equations, so the hypothesis described above was not directly tested. However, he discovered that travel time had a negative (but statistically insignificant) impact on the total number of outpatient visits to both public and private sources of care. In addition, the amount of travel time to a public clinic relative to that for a private clinic had a statistically significant (90 percent level) negative effect on the probability of using the public clinic[9] (Heller, 1982).

In a multivariate study of outpatient visits made on behalf of children in the Philippines, it was found that the choice of self-treatment, traditional healer, public modern services, or private modern services was affected by the relative distance of the alternatives. Other things equal, the probability of using a specific source of care was increased the more distant were the alternatives (Akin et al., 1981b).

Thus the general expectation is that travel cost, as a composite of both cash outlay and time (or distance) cost, will act as a deterrent to using health services. Where the whole range of alternative sources of care is available, transportation cost should act as an allocative device determining (when all other effects are controlled for) which health care alternative is chosen. In cases where the cash price charged for using a

service appr hes zero, the relative importance of travel cost as a deterrent should become greater.

Waiting Time

As with the time spent traveling, there is an opportunity cost in waiting for service from the public clinic or private practitioner. The importance of this cost is highlighted by the fact that sick people, especially in low income countries, are often accompanied by another individual. As a consequence, the cost to the household of consuming health care may be quite significant in terms of the forgone earnings of all the people involved in the visit and the need to juggle child care responsibilities and other household chores.

Waiting times can be quite long, especially for government clinics. In Calabar, Nigeria, in 1976, waiting time varied substantially according to the source of care, and was longest at government health facilities. The mean visit at public facilities was about one and a quarter hours with a range of from zero to eight hours (Gesler, 1979). In the Ivory Coast, Lasker (1981) observed that government services might be so swamped with patients that people would wait hours to be seen for a few minutes of attention. She noted that often after this initial wait, it would become clear that supplies or personnel were unavailable, so travel had to be undertaken to another clinic. Laboratory tests might require several days before results would come back, and the issuance of prescriptions would probably be the beginning of another wait, this time for drugs. For rural people, if lengthy waits force overnight stays in town or return trips to complete a single visit, costs can skyrocket and quickly exceed what can be borne.

In West Malaysia, a mean waiting and examination time of 42 minutes for government clinics and 31 minutes for private clinics can be calculated from the Heller data (1976). Heller found, however, that waiting time was not an impediment to use. He suggests as an explanation that patients may have looked on waiting time as a chance to socialize. Cosminsky hypothesizes that the desirability of waiting at a facility is partially determined by the physical setup of the clinic. In Guatemala, she found some people complained about the time spent waiting in the government clinic and indicated it was a factor in their not going to the clinic another time. There was no complaint, however, about the time spent waiting for the local herbalist or spiritist, which was often the same amount of time or even longer. One factor causing this behavior may have been the atmosphere of the clinic, which was very formal. Chairs were lined up in rows, with people sitting separately and silently. In contrast, when waiting for the spiritist or healer, whether outside in the yard or inside, people moved around, benches and chairs were arranged so people could talk to each other, and more interaction and socializing occured*

So, while waiting time is categorized as a cost in this analysis, it is quite possible that there are other ameliorative factors involved which may complicate its actual effect. However, table 28 for Uganda shows such long waiting times for all types of government facilities that even if some threshold amount of waiting time is inconsequential to users, such long bouts in the waiting room as these must at some point become costly. While waiting time varied by facility, on the average, 53 percent of all patients waited two hours or less, 31 percent waited over

* Sheila Cosminsky, personal communication, April 20, 1982.

TABLE 28. Waiting Time in Public Facilities--Uganda

Facility	% Waiting for Treatment (Hours)						
	0-1	1-2	2-3	3-4	4-5	5+	Mean
Aid posts	17	25	20	18	7	13	
Dispensaries	47	26	11	15	1	0	
Health centers	8	23	18	13	12	26	
All facilities	28	25	16	16	5	10	

Source: Gershenberg and Haskell, 1972.

three hours, and 10 percent waited more than five hours.

Properly speaking, waiting time itself is not the variable of interest here, so the information above should be taken as a rough guide to a larger story. The actual cost to the individual waiting to be seen at a clinic is not the time spent, but the value of the time lost from other activities in order to be at the clinic. Small children, for instance, could wait for hours without incurring any economic cost because there would be few valuable alternative economic activities that they could have engaged in had they not been at the clinic. The child's mother, however, would be missing time at a job, in marketing, in producing goods for the household, or in informal market production. Waiting in a clinic would impose a real economic cost on her. By similar reasoning, a woman with more education or experience might be losing more potential wage earnings in a waiting room than someone with a lower value of time.

If people are aware of the value of their time and of the relative lengths of time they would have to wait at different health facilities, then it would be expected that in choosing a source of care they would minimize the total cost, including this time cost. Thus a woman with a low opportunity cost (few alternative uses) of her time might consider waiting a long time at a government clinic in order to get a free consultation whereas a woman with a high opportunity cost of her time would prefer to pay a private doctor for a quick consultation rather than wait at a public health facility. Since the latter woman's waiting time would be shortened by paying a fee, she might in the end get a less expensive visit than she would have gotten at the government clinic when the total cost is accounted for. Akin et al. (1981b) were not able to model this phenomenon perfectly but got results which suggested that the value of mothers' time was an

important deterrent to using child outpatient services which had long waiting times.

Money (Cash) Price

The actual cash outlay for using a health service should, other things equal, act as a deterrent to use. Furthermore, it would not be expected that charges for each service would be equal. As noted, government clinics usually charge nothing. Traditional and private modern practitioners generally charge a fee, but it cannot be stated unequivocally which of the two would be higher in all circumstances.

Since most past studies have examined government health services alone, price has rarely been studied as a factor in use. In addition, the noneconomic disciplines have not usually been interested in prices as a determinant of behavior, so very little price data have even been collected.

In a few studies, however, fees have been mentioned. A study of rural health care providers in Bangladesh found that among five different types of private practitioners the most highly trained (modern allopathic) charged considerably more than any of the others. Although the effect of the price structure on use was not tested, other information indicated that the most expensive practitioners were also the most often used; this was probably because of quality considerations, but it could not be analyzed further with the available data (Claquin, 1981).

A study in Tanzania compared use of two hospitals serving the same area. One was a free, 90-bed government hospital with a medical staff of one Tanzanian doctor with two medical assistants. The other was a 240-bed mission hospital which had three expatriate doctors and one medical assistant on the staff. It charged a fee for treatment. Even though the

private hospital was nearly three times larger than the government hospital, the government hospital treated approximately three times as many outpatients over a 12-month period. This mimicked the experience in Tanzania as a whole. With the same size total staff and same number of beds as private charitable agencies, government hospitals in 1967 treated three times the number of outpatients and twice the number of inpatients (van Etten, 1972). While these results come from simple correlations, controlling for almost no other factors, they do suggest that cash price is a deterrent to usage when alternatives are available.

The Heller model of West Malaysian medical services found that the total demand for outpatient care from all sources was insensitive to the cash price. Yet the decision as to which alternative to use was somewhat sensitive to the prices of the other practitioners. A 1 percent increase in the price of a visit to a private practitioner caused approximately a 2 percent increase in the demand for public services; similarly, if the cost of modern care rose by 1 percent, traditional practitioners experienced almost a 2 percent rise in demand (Heller, 1976). The study of Filipino child outpatient demand got inconclusive results for the effect of the cash price of services on use. Because the survey used for this study contained only household expenditure data and not actual price information, it was not certain that the lack of measurable effect for prices was because of actual insensitivity to cash costs or measurement error in the price variable (Akin et al., 1981b).

Possibly because of cultural features, prices might yield confusing results. For example, in some cultures health facilities are thought to betray their low quality if they are unwilling to charge a price for what they do. In Zaire, mobile health teams found that villagers were unreceptive

to and suspicious of services which did not cost money; so a fee structure was imposed. Mission churches in Zaire had a similar experience. Demand increased after charges were initiated for services. People felt that health was valuable and should therefore be worth some price (Lashman, 1975). A survey of an Abidjan neighborhood in the Ivory Coast found that 41 percent of the respondents preferred to pay for medical services. Another Ivory Coast survey of 1,000 people in six major cities found that 80 percent of the respondents felt they were better cared for if they paid for the care (Lasker, 1981).

Payment methods may also affect the true cost to the patient. In Lesotho, modern doctors often charged less than native ones but the modern method of payment was alien to the local culture. Expatriate doctors required payment all at once, while indigenous practitioners divided the fee into two parts and demanded the second only if a cure had been effected (Pielemeier, 1975). The Zulu of South Africa offer an analagous situation. For an illness, indigenous practitioners charged fixed fees divided into two parts. There was an initial payment when consultations began and a later one (cash and/or a cow or chicken, depending on the practitioner) after a cure had been effected. The fees of indigenous practitioners sometimes were quite high, but since the charges were known in advance, households could budget for them. This was contrasted with modern practitioners, who charged for each treatment. For modern practitioner visits, the total cost of an illness might have turned out to be low, but it was not predictable in advance and thus could not be budgeted for in a situation where resources were extremely scarce (Ngubane, 1981). Other writers have suggested that indigenous practitioners have developed payment practices which are well adapted to the local economy. These include the above-

mentioned lack of fee-for-service billings but also a greater willingness to forgo money transactions altogether or to carry the patient until the next harvest season (Good et al., 1979).

Spring (1980) in her Zambian study noted that when the patient successively mixed visits to traditional and governmental practitioners, and a cure was made, the traditional healer generally took credit and demanded payment of the fee. This practice was made possible because no competing bill from the government would be forthcoming. To the extent that this procedure is widespread, free governmental medical services may not reduce illness costs as much as they simply underwrite greater experimentation on the part of the patient.

It also must be realized that fees may not always be of the amount reported. Since it is common for government doctors, nurses, and midwives to conduct private practices, it is not known to what extent public clinics are used to refer patients to after-hours private consultations. Moreover, side-payments must be recognized as a fact of life. It is not unusual for government medical personnel in some countries to require a fee for nominally free injections, or for gifts to be proferred before free government treatment is given (Lasker, 1981). Cosminsky (1972) found the staff of a nominally free Guatemalan government hospital had told some Indians they would be admitted only if they could pay--otherwise, there were no beds available. (This situation may have been because of discrimination against the Indians by the non-Indian hospital staff.) In another area in Guatemala, some people believe they will not receive good treatment in the government hospital unless they are referred by a private physician to whom they would have to pay a fee. In 1978 the fee of the local physician was $4.00, the equivalent of four days of pay for a plantation worker. Thus, while the

hospital was theoretically free, many people correctly perceived it as entailing a high financial cost.* Thus it is quite difficult to insure that services reported to be free are actually free, although the researcher must assume that this is the case in the absence of information to the contrary.

Coinsurance/Social Security

In certain low income countries social security systems exist which offer free health care (Navarro, 1974; Reineke, 1976) from general social security institutions or insurance schemes for selected groups of workers. This type of system is prevalent in South America. Brazil's social security system covered approximately 36 percent of the population in the late 1960s. Direct service from social security hospitals and outpatient facilities was available to only 10 percent of the covered group; for the others the system operated like an insurance plan. The Brazilian system expanded enormously after its inception in 1933; since then it has also changed the organization of medical services in the country by increasing access to modern care and improving the quality of the available services (Bastos, 1971). In Chile, the social security system in 1968 covered about 73 percent of the population, either through coinsurance or a system of free public facilities. Analysis has shown that expanded social security coverage in Chile has resulted in greater use of all modern services, particularly preventive and dental services (Hall and Diaz, 1971).

In countries where social security coverage is not so complete, there can be substantial variation in use across the population solely because of

* Sheila Cosminsky, personal communication, April 20, 1982

who is covered and who is not. In Nicaragua in the early 1970s the social security system covered approximately 8 percent of the population, which meant that the Ministry of Public Health and the National Board of Social Welfare supplied government services to the remaining 90-92 percent of the population. The social security institutions reported twice as many consultations with physicians as in the other systems. The relatively high level of physician use in the social security facilities implies that the supply of physicians was greater and care was of a higher quality than that in the other government facilities.

Where small portions of the population are covered, usually only government employees and other salaried personnel are included. In Morocco, the law states that all regularly employed wage and salary earners are to be covered, but this translates into only 15 percent of the labor force, 75 percent of whom live in Casablanca. In rural Mexico, most subsistence farmers do not quality for enrollment in the social security system because they are not wage earners and do not belong to eligible organizations. Thus they are excluded from the social security clinics that dispense free services in most town and cities. To remedy this situation, the social security system has begun to open free clinics which compete directly with rural clinics supplied by other governmental agencies (Young, 1981).

The pattern for utilization studies just described has several implications. First, if social security hospitals and clinics exist but are excluded from analysis, which often happens in facility-based studies, the utilization behavior of an important segment of the population is missed. Second, social security systems may offer coinsurance schemes which reduce the price of covered services but leave other prices unaffected. This will skew demand by insurees toward the covered services. Third, since

traditional practitioners are rarely if ever included as providers in social security systems, the existence of a social security system will directly reduce the demand for indigenous healers in areas where it is available. Fourth, prices charged may vary by source of payment. Mama Yemo Hospital in Zaire charges $5.00 for a normal delivery if the patient pays, but $20 if the patient is insured (Lashman, 1975).

Whether these points are important depends totally on the country being studied, and, therefore, should be taken into account when international comparisons are made. In the Philippines, 19.5 percent of the households sampled were covered by Medicare or health insurance. Of these, 12.3 percent reported that the whole family was covered; 18.8 percent, the mother only; 17.5 percent, the father only; and 37.1 percent, the children only.

OTHER PRICES

Substitutes (Alternatives)

Up to this point traditional, modern public, and modern private medical services have been treated as substitutes for each other. They may not be perceived as being of equal quality, but this does not preclude the substitution of one for the other if the relative prices of the alternatives are sufficiently different. In other words, patients may find it adequate to substitute inexpensive, low quality care for expensive, higher quality care under certain circumstances.

According to economic theory, any of the costs cited above could divert demand from one service to another. In the case of government clinics, long waiting times are often cited as the reason people use private facilities

instead, but this cost cannot be singled out unless transportation cost, cash price, and other factors such as value of the patient's time are controlled for.

An example of the type of thinking referred to here can be taken from the previously mentioned examination of treatment choices in the rural Mexican village of Pichataro (Young, 1981). During the study period of 1975-77, the 2,900 residents of Pichataro had a choice of a number of local practitioners: 15 part-time indigenous curers, 3 "good witches," 8 traditional midwives, and 3 nurses with one year of training or less (a man in private practice, a nun at a convent, and a National Indian Institute nurse). In the town of Patzcuaro, an hour away by bus, there were six private doctors charging about 150 pesos per visit (most of a week's wages for a day worker) and a Class A health center staffed by two recent medical school graduates, two part-time physicians (also in private practice), and a number of auxiliary personnel. The private physicians were perceived to be extremely expensive but required less of a wait, offered a more elaborate examination, and were thought to be of much higher quality than the public clinic. The public clinic charged a fee of a few pesos and sold pharmaceuticals at a discount when available. When drugs were not in stock at the public clinic, they had to be purchased for full price at a pharmacy. Occasionally patients could avoid the cost of using doctors by directly visiting pharmacies to get treatment. Another alternative which became available late in the survey period was a social security hospital/clinic which offered services to people who did not normally qualify for social security benefits. This clinic was in another town two hours away from Pichataro. All services and medications were available from the social security clinic at no cost to the patient.

Taking other variables (such as the seriousness of the illness, the education of the individual, household income, beliefs in disease etiology, and so on) as constant, the choice of practitioner for the citizens of Pichataro should have been conditioned by the relative cost of consuming equal-quality units of services from the alternative sources. An individual could get instant, inexpensive, and what was perceived to be low quality care from the local modern and traditional practitioners. Alternatively, a trip to Patzcuaro could be made if the cash cost and the time involved could be spared. At Patzcuaro, fast, expensive, high quality care could be purchased from a private doctor; fast, cheap, nonprofessional service could be gotten from a pharmacy; and slow, medium-priced care of uncertain quality could be purchased from the public clinic. Costs at the public clinic also tended to be unpredictable, depending on the availability of drugs. A trip to the well-thought-of social security clinic could be undertaken, but that trip would cost more and take about twice as long as the one to Pichataro. Nevertheless, it was certain that the cost of all services at the social security clinic would be zero; so the only privately-borne expenses would be related to the trip and the waiting time.

Clearly, there were many possible courses of action even in this small community. Busy people who had ready cash and were sensitive to quality might have been inclined to visit a private physician. Other people with very little cash, sensitive to quality, and with some time to spare might have been willing to take the long trip to the social security clinic. Those who were extremely busy might have felt constrained to use the low quality sources of traditional and modern medicine available in the town itself, while those with an acute shortage of cash might have considered applying to the nuns as a charity case or taking their chances at the

public clinic in Patzcuaro. Thus all sources of care could have been used as substitute for one another, and the different costs associated with each facility would have a rationing effect on use. However, not everyone would have reacted in an identical manner to the different types of costs. Individual reactions would have depended on household constraints.

A review of the data gathered for Chapter 2 indicates that self-treatment is also considered by many households to be an adequate substitute for professional care. In economic terms, the desire to engage in home treatment would be expected to be conditioned by the prices of alternatives; consequently, it is an important consideration which also needs to be included in the analysis.

The sociological and anthropological literature considers substituting providers for one another and mixing providers to be a disease-based phenomena rather than caused by economic factors. Some support has been found for this hypothesis; patients with similar ailments often choose the same type of practitioner (Lasker, 1981; Lee, 1975). In Botswana, for instance, diseases are classified as either European or Tswana. "European" includes smallpox, upper respiratory illnesses, and skin lesions. "Tswana" includes venereal diseases, infertility, hallucinatory problems, gastro-enteritis and dehydration, and malnutrition (Pielemeier, 1975). Other studies have shown that patients tend to prefer traditional sources of care for diseases that have supernatural origins. The malay study already cited (Colson, 1971) reports the utilization patterns collected in table 29. The patterns are subdivided according to a natural/supernatural classification of the diseases. A similar classification of diseases for a sample from Ghana yielded the results in table 30.

TABLE 29. Choice of Service in Percentages by Nature of Ailment--Malaysia

Source of Care	Natural	Supernatural
Clinic	54.1	4.2
Native health practitioner	2.6	31.0
Private physician	3.4	7.3
Medicine vendors	15.4	1.0
Self-treatment	4.3	25.4
No treatment	9.0	---
Clinic & native practitioner	4.3	22.2
Other combinations	6.9	9.0
Total	100% (N = 233)	100% (N = 287)

Notes: Natural = disorders caused by animals, insects, germs, rapid climate changes, fatigue, poor diet (44.8 percent of all diseases).

Supernatural = caused by supernatural beings such as Hantus, Jin, Orang Bunjr, or Sejundi, due to malevolence or revenge on the part of the agent, or witchcraft by another person. To these have been added the breaking of a Pantang (a behavioral proscription) or a breach of an ethical precept, which Colson separates into two additional categories (55.2 percent of all diseases).

Source: Adapted from Colson (1971), p. 235.

TABLE 30. Choice of Practitioner in Percentages by Nature of Ailment--Ghana

Source of Care	Natural (N = 109)	Supernatural (N = 26)	Both (N = 58)
Public clinic	46.8	15.4	29.3
Other clinic	6.4	---	8.6
Drug seller	1.8	---	3.4
Traditional practitioner	2.8	30.8	6.9
Self/family	17.4	42.3	20.7
No treatment	24.8	11.5	31.0
	100%	100%	100%

Notes: Natural = caused by impurities in the blood, head, or stomach; overexertion; exposure to excessive heat, sun or cold; accidents; and insect bites (56.4 percent of all diseases reported).

Supernatural = caused by witchcraft and juju, breach of taboo and ancestors or gods (13.5 percent of all diseases).

Both = patient cited both of above causes.

Source: Fosu (1981), p. 479.

The results of these two studies were amazingly similar. There was a clear preference in each case for indigenous practitioners and self-treatment for illnesses for which supernatural agents were cited as the cause. In fact, Colson observed that this classification came closer to accounting for the choice of practitioner than any other scheme. Fosu explained the popularity of home remedies in Ghana for supernaturally caused diseases by citing the popularity of traditional family preparations for cases of breach of taboo.

Other analysts have considered the length and severity of an illness as a correlate of choice of practitioner (Gould, 1957; Rubel, 1966). Another popular classification has been whether the illness is psychologically or physically based. In these cases, it has often been assumed that patients prefer indigenous practitioners for psychological problems, but there have been few attempts to analyze this statistically (Kiev, 1962; Lambo, 1964).

In a model based on economic motivations, these noneconomic modes of behavior would cause unusual results unless they were controlled for. These points are addressed more specifically below in the section on beliefs; while it is difficult to identify and measure such matters of taste (or orientation), every attempt will be make to do so in this study.

Complements

Most medical visits require that some type of regime be followed at home afterward. Rational people will discover after some experience whether the cost of the home treatment is higher for one service than for another. For instance, it has been observed in the Ivory Coast that in rural areas traditional medicine or self-treatment with herbal preparations are

reasonable alternatives to modern medical care. For the most part the herbal treatments can be prepared cheaply or free at home. In cities, however, herbs must be purchased, eroding the cost advantage of indigenous practices over modern ones (Lasker, 1981).

Both modern and traditional medicine are heavily dependent on drugs for many treatments, even if only for a "placebo effect" (Riley, 1977). In low income countries, the usefulness of modern drugs will be questionable if they are not readily available, are not easily kept, or are difficult to use under local conditions. Shortages of drugs are a major bottleneck for public clinics. At the national level in most low income countries, supplies of pharmaceuticals are highly dependent on the actions of donor agencies; warehouse facilities and record-keeping are often inadequate. At the local level, drugs are often unavailable because of transport problems and the inability to predict demand. In Afghanistan before the middle 1970s, deliveries of drugs to local health units were made only once every two years (O'Connor, 1980). In the Cap-Haitien provincial hospital in Haiti, there is high attendance when supplies come in, but it is low during months that there are no drugs available (Beamer et al., 1972).

Another problem is that the cross-cultural communication of home treatment often fails to elicit the proper response. A study of hypertensive, diabetic, and penicillin-treated patients in South Africa found that over 60 percent of the hypertensive and diabetic patients and 24 percent of the penicillin-treated patients had not complied with their prescriptions, even though they had all received the proper medicine (Unterhalter, 1979).[10] A survey at an African dispensary revealed that 25 percent of the patients did not know how to take the drugs they had been given. Many of the patients

could not read, but even among those who could, elaborate instructions on a bottle were not understood. A quarter of the literate patients did not understand what the symbol "1/2" meant (King, 1966). A survey in an upcountry town and village in the Ivory Coast found that 24 percent of the respondents did not always buy prescribed medicines. A second survey of 1,000 Ivory Coast city dwellers reported that less than half of them always bought the medicines prescribed for them (Lasker, 1981).

The inability of a patient to comply with prescriptions reduces the treatment's effectiveness and thus raises the relative cost of modern medicine. Similarly, the effectiveness and relative cost of traditional medicines are important to the success of indigenous treatment regimes. The difference, though, is that traditional drugs are readily available, the cost and preparation is usually included in the healer's fee, the dosages tend to be simple, and the measurements are usually more informal than for modern drugs. Spiritualists often do not depend on drugs at all but perform rituals or say chants to effect their cures.

Another complementary cost of a health service is the requirement for return visits. If one service tends to require follow-up visits more than another, then treatment there is more expensive to the patient. In fact, current visits are often the result of past visits. For example, out-patient care is often required following an inpatient stay; so previous hospital or traditional inpatient facility stays influence use of out-patient facilities (Heller, 1976). This pattern of sequential visits is particularly relevant to the birth process. If mothers fear that making prenatal visits to a modern facility will lock them into an expensive program which includes modern clinic/hospital delivery and later visits for postpartum care, then they may avoid making any contact at all with the

modern sector. Indigenous midwives usually include a traditional package of home visits for prenatal care, delivery, and postnatal care in one easily predictable fee (Oliva, 1982). Unless modern practitioners charge in the same fashion, their services may be perceived to be more expensive or unpredictably costly.

A phenomenon noted in the the patterns section should be mentioned here. Many individuals in low income countries apparently use modern and traditional care as if they were complements of each other. The mixing of providers is so well established that, even in cities where Western medical facilities are within easy reach, a large percentage of people still visit traditional healers or have native medicine secretly brought to them in hospitals (Oyebola, 1980b). Spring (1980) observed that in Zambia, spirit possession doctors and midwives performed rituals on the hospital grounds while their patients were being treated inside. Filipino researchers found that after traditional midwives underwent training as family planning motivators, some of them began to accompany their patients to the government clinic for prenatal examinations even though a traditional delivery was planned.[11]

On the whole, the argument here is that the major complementary cost of health services is the cost of medicines. Prescription costs will differ for different practitioners, and this will affect utilization behavior. The prescription issue is complicated, and a perfect model requires information on supply and compliance as well as cash price. Moreover, if medicines are not available from the practitioner, the transportation and time costs necessary to obtain a prescription from another source should be included in the calculus.

INCOME

Generally a rise in income is expected to cause an increase in the consumption of most goods, including health care. However, the effect of changes in income on the demand for a specific good cannot be accurately predicted in advance. With respect to health care, an increase in income raises the household's capacity to purchase medical care, but if the added income is used instead to purchase other goods which improve the household's health status, total medical visits may actually drop. Alternatively, increases in income may be spent on unhealthful consumption such as tobacco or alcohol, which would tend to increase health care needs in the longer run.

Heller (1976) found that because of the wide availability of medical care in Malaysia regardless of household income, increases in cash income did not significantly alter the total demand for health services. Rather, the effect was felt in an increased demand for higher cost private modern care relative to public services and in a substantial increase in the consumption of prenatal care. These results suggest that increases in income in poorer countries may have the primary effect of directing demand toward services of a higher perceived quality. Akin et al. (1981b) found that their sample of sick Filipino children came from relatively well-off families. The wealthiest quintile supplied to the sample almost twice the number of sick children provided by the poorest quintile. This suggests that the perception of illness in the children was itself related to income or to some other phenomenon for which income acted as a proxy (social class, etc.). Income was not, however, a statistically significant determinant of the choice of health facility in the Akin study.

As mentioned earlier, evidence indicates that a substantial percentage

of Third World household incomes is already spent on health services. In Thailand, an average of $7.70 per person, or 5 percent of per capita income, is spent annually on health care and medicines. Public expenditures in 1970 were $66 million, while private expenditures totaled $269 million (Woolley, 1974). In 1973, Pakistanis spent $150 million on private modern services plus $30 million on traditional practitioners, for a total private expenditure of $180 million. For comparison, in fiscal year 1974, the government of Pakistan spent $38 million in public funds on health services (Furnia, 1976).

A 1969 survey of 552 families in Santo Domingo, Dominican Republic, found expenditures on private health care to range (by family size) from $6.73 to $15.13 per month, or from 1.7 percent to 6.2 percent of total family expenditures. Total average monthly health care expense was $11.52, of which $5.46 went to private practitioners and $6.06 went to medicines (Lashman and Daly, 1974). The previously mentioned Afghanistan survey also found high expenditures on private practitioners and drugs (see page 5). This led to the realization that village health workers could be paid through the sale of medicines as an alternative to direct government salaries (O'Connor, 1980).

Sources of Income

Little is known about the impact of income sources (wages and salaries, farm income, business income, or rent) on the demand for medical services. To the extent that the income source is a proxy for position in the community, it might be expected that the landlord and business classes would be more oriented toward private and/or modern facilities, would have a better knowledge of symptoms and the availability of services, would have better educations, and would have greater choice as to where to seek care. A high

proportion of profit or rental income might, therefore, indicate a preference for private modern care.

Occupation may also be important. Especially in Africa, it is not unusual for many villagers to leave their village for larger cities and urban work once the harvest is in. Similar patterns exist where plantations offer alternative employment or where mines exist. In Lesotho, 60 percent of the male labor force is absent and 10 percent of the women are classified as absent (Pielemeier, 1975). Occupation-caused absence affects where care is sought, who seeks it, and possibly the amount of cash available in the home. Occupation also matters because some employers may offer coinsurance or health services directly, which may affect what care is sought. Type of employment can also affect the health status of the individual by exposure to the elements, lethal substances, polluted air, accidents, and so on.

Composition of Income (Cash/Noncash)

In low income countries it is essential to measure noncash income. This includes the value of animals slaughtered, vegetables or grains grown and consumed at home, other types of home production, and imputed rent. Income from these sources may not show up in income calculations based on market work, but it may free up cash income to be spent on discretionary purchases of market goods such as medical care. Thus a rural household with a low level of cash income may actually be found to spend it quite freely for drugs and medical services because the cash is not needed for meeting day-to-day necessities.

Another aspect of this noncash income phenomenon is the willingness of the health care provider to accept noncash payments, or payments of goods

and services, in place of his usual fees. If this occurs, the cash cost to those with low access to cash-paying occupations may be reduced. This type of payment system can work like a sliding fee scale to raise the demand for a provider's services through a form of price discrimination that does not show up in the nominal fee structure.

A higher level or proportion of noncash income in a household's budget may indicate a proclivity for the use of traditional forms of care, partially because of ease of payment. There is some evidence that traditional practitioners may be more willing to accept in-kind payments and to wait for payment until the next harvest (Good et al., 1979). Moreover, low cash income households might be expected to be less familiar with the market economy in general and thus be unaware of some of the alternatives available in the medical market.

Table 31 presents survey evidence on the willingness of different providers to use a sliding fee scale and to accept payment in kind. The data come form the 1981 survey of 518 health facilities in a rural three-province area of the Philippines.

The public facilities are included in table 30 because even though most of their services were claimed to be provided free, charges were made at many clinics for home deliveries, clinic deliveries if available, and house calls. In addition, pharmaceuticals usually commanded a price; even when they were available free, they were usually reported to be available only occasionally. Thus some rationing was necessary, which is probably reflected in the percentage employing sliding fee scales. In general, even though the public facilities charged significantly less for their services than either private modern or traditional practitioners, they were much less willing to accept payment in kind or to offer a sliding

TABLE 31. Payment Practices for Rural Health Facilities--the Philippines

Type of Facility	% Using Sliding Fee Scale*	% Accepting Payment in Kind
Public clinic (N = 50)	56	8
Private clinic (N = 60)	80	77
Public hospital (N = 15)	53	0
Private hospital (N = 40)	78	50
Traditional midwife (N = 194)	81	80
Traditional healer (N = 101)	88	67
Private midwife (N = 41)	85	68

* This includes the percentage claiming that no fee is charged, that only voluntary contributions are made, or that a sliding fee scale is used.

Source: Griffin et al. (1981).

fee scale than either of the other two types of practitioners. Consequently, the cost of using the public clinics or hospitals could be prohibitively high for cash-short households, and the cost would be highly dependent on the availability of free drugs. As expected, the percentage of traditional practitioners using these ameliorative payment devices was quite high, but the proportion of private doctors using the same practices was, surprisingly, almost as complete.

Young (1981) reports that the people in his rural Mexican study were aware of the specific private doctors in the neighboring town susceptible to pleas for reduced charges. This fee reduction procedure was familiar enough that residents knew to wear their most tattered clothing when making "charity case" visits.

Another type of informal price cutting was discovered during the Filipino facility survey. Some government and private health practitioners insisted on adjusting the type of treatment given and the medicines prescribed according to the perceived economic status of the patient. Thus a prescription of the antibiotic Guaramycin for tuberculosis, costing 12 pesos per shot daily, might have been written for an apparently well-to-do patient, whereas an apparently poor patient would have been given INH (isonicotinic acid hydrazide) tablets, cough syrups, and a shot of streptomycin every other day. The more expensive treatment would be expected to lead to recovery in three to six months while that given the poorer patient might cause the recovery time to be one to two years (Oliva, 1982).

This evidence suggests there are a number of reasons to expect that the reported prices of practitioners actually overstate the differences in the effective cash costs associated with each source of care. For analysis, this implies that the actual effects of price variables may not be clearly

distinguishable unless the willingness of providers to adjust fees is controlled for. For policy, the implications are two-fold. First, public facilities should take great care to avoid drawing poor, rural, cash-short patients into clinics with the promise of free services unless subsequently nonnegotiable demands for cash payments for drugs or other related items can be avoided. Second, there is some likelihood that free government medical services will simply siphon off some of the existing "charity cases" seen by private practitioners. Thus a partial effect of governmental expenditures would be to replace informal private subsidies with public money.

Wealth and Assets

Wealth would normally be expected to be highly correlated with income, but knowledge of its levels should supply some independent information for explaining the levels and types of consumption of medical services. If, for instance, assets are accumulated over a lifetime, a relatively high level of wealth may be observed in an elderly household which has a fairly low earning capacity. Assets, held in the form of bank deposits, land, or even animals, might imply an enhanced capacity to use health services and possibly to afford higher quality services than income alone would suggest.

Young (1981) found villagers had a number of ways to raise cash for medical needs. The preferred method was to get an unsecured loan from a relative, friend, or person known to have a regular income (school teachers). Alternatively, several hundred pesos could be raised quickly by selling livestock, or (least desirable) moneylenders could be used. Moneylenders, however, charged about 25 percent interest per month and required collateral in the form of land or buildings; so this was an extremely risky alternative.

Yet with both selling livestock and borrowing, the existence of marketable assets was important for securing cash.

Assets can have another important function in the household. Income can be used to invest in durable consumption goods or housing; if this is how a household has invested in the past, then assets may not imply a greater capacity to pay for health services so much as they suggest a healthier household and a lower level of medical need. For example, windows can be screened, doors fixed, sanitary toilets installed, and water piped in. These assets can improve health directly and tend to reduce houshold time costs (Okediji, 1975; Popkin and Roco, 1979; White, et al., 1972). For instance, in India the presence of livestock in and around the household increased the probability of death from neonatal tetanus because the tetanus-causing spores were released through human and animal fecal matter (Smucker et al., 1980). Sequestering animals away from humans would involve expensive household-related investments, but these activities would reduce exposure to tetanus and probably other diseases as well. Where houses are plastered with dung, improved building techniques and construction materials would reduce exposure to disease.

Similarly, if electricity or gas are available, investments can be made in a refrigerator or a stove. These and other appliances reduce the bacterial contamination of food, permit the consumption of a greater variety of foodstuffs, and increase the efficiency of household production. If assets are held in the form of a bicycle, cart, horse, motorcycle, or even a car, then travel time can be used more efficiently, lowering the opportunity cost of trips and making distance less of a barrier to health service use. If televisions or radios are purchased, then people are able to avail themselves of more information. To the extent that the

government uses the airwaves for health education, these assets permit even illiterate people to learn about better health habits and available medical resources.

This is a fairly broad view of assets and what they can be used for. As suggested above, the major use of some types of wealth is simply as a reserve that can be converted into cash. But when the household is viewed as a producing unit, in this case as producing healthy household members, the forms in which wealth is held constitute the capital, or plant and equipment used in this production activity.

While these items are usually taken to be simply proxies for environmental conditions, the household production framework gives them significance not only as environmental factors but also as economic parameters that directly affect the efficiency with which good health is produced in the household. Similarly, capital formation in the household can also be directed specifically toward individual household members by making investment in education or preventive health measures, but these variables are addressed elsewhere.

Note that while the types of investments we described are often associated with wealthy households, they do not necessarily require cash to be undertaken. Many of the items mentioned can be undertaken with household labor. For instance, improving water storage or sequestering animals away from humans can be done using a minimum of purchased goods and "free" household labor. Consequently, the health-improving investments that can be made in the household, given the appropriate technology, could conceivably be an important intervention point for governmental health programs.

So far the discussion has centered around how wealth is held at the household level. Households, however, also have the ability to pool their savings either through governmental or private action. The resulting public

assets can have a major effect on the healthiness of the community since so many of the health problems in low income countries can be alleviated by the control of disease vectors, the improvement of water supplies, and the systematic disposal of waste. While these types of investments are public goods, the provision of which is much less well understood than private consumption, it must be assumed that households have some control over conditions in the community environment. This can come from direct action (where possible) or through migration.

The discussion above implies that the demand for health services will be affected by the level of household wealth and the ways in which it is held. It is not practical to control for every type of asset a household may have accumulated, but a selection of a few important items, such as the condition of the dwelling, the availability of potable water, the healthfulness of waste disposal methods, and the existence of certain appliances, can be used. Heller (1976) got mixed and generally insignificant results from his Malaysian study when he used two dummy variables to indicate whether treated water was piped into the household and whether a flush sewage system was used. The only statistically significant coefficient indicated that the total number of outpatient visits was reduced if a flush sewage system was used. This was the expected result. Heller's estimate seemed to imply a high correlation between income and the effects of these assets (also to be expected) but this may have resulted, at least partially, from the fact that he limited his sample to users of the services instead of including all sick individuals irrespective of the type of treatment they sought. Miners (1979) included a dummy variable indicating whether the dwelling was in sound condition in his demand analysis of North Carolina data, but he also got insignificant results. Akin et al.

(1981a) found that owning a refrigerator and the quality of toilet facilities were significant factors in determining the duration of breast-feeding in Sri Lanka. While this is only indirectly related to health status, the Akin study gives some evidence of a link between health practices and certain household assets.

This section also suggests that community assets can be important determinants of health status, can be quite variable, and should be included in a fully specified model of demand for health services. Such community variables have not been included in the past and their inclusion may be difficult because of data limitations. Nonetheless, if household information on sewage disposal and water supply is used, then by implication community information on these services can be said to have been used. Piped water would not exist in the household if it did not first exist in the community. It is plausible, however, that community data on the conditions of roads, drainage, waste disposal, and quality of water supply would supply important independent information on health conditions.

TIME ALLOCATION

The consumption of medical services is naturally affected by the daily routine in the household. The amount of time available to a person for the consumption of health services varies inversely with the amount of time that must be spent in other activities such as working, cooking, farming, fetching water, and marketing.

Higher income households would be expected to have more time to seek out care because of their greater capacity to purchase goods in the market rather than having to produce them at home in a time-intensive manner.

Moreover, their household activities would more likely be aided by machines or domestic workers. In contrast, subsistence level households would for all practical purposes be excluded from many market activities because of a lack of cash and the large expenditure of time necessary just to survive. Such time use patterns may help to explain why rural households and those in the greatest medical need are repeatedly found least likely to use medical services (Heller, 1976).

In many countries, it is increasingly the case that women are engaged in market jobs. The proportion of women engaged in market production has always been very high in low income countries, but now a greater proportion of their jobs may require absence form the home and may be incompatible with medical care usage. Filipino households with working women were found in some situations to experience a lower incidence and intensity of breast-feeding, a reduced value of home production, a smaller use of social services, and lowered nutritional status for the children (Popkin and Solon, 1976). This implies that such households might not only have been less healthy but also less able to use medical services than households with a nonworking mother. Blau (forthcoming) found higher levels of education tended to push Nicaraguan women into formal employment and out of the informal job sector. More educated women also breast-fed their babies for shorter lengths of time, but the nutritional status of their children was better than that of the children of less educated, and presumably less employed, women. Somewhat similar results were found for Malaysia (Heller and Drake, 1979). The differences in results for the Philippines and the other two countries may have been because of differences in model specification, but they are probably caused by the complexity of the issue. Working women have a higher value of time, but higher household income is

a byproduct of this. The counteracting effects of these two phenomena--more income to purchase goods but less time available for work in the home--must be carefully sorted out.

Sanjur (1978) found that working mothers used fewer health services but were more likely than nonworking mothers to use family planning services. Rimando (1976) also found lower use of health services among working rural Filipino women. In the previously mentioned survey of mothers in Ibadan, Nigeria, 50 percent of the working mothers cited time constraints as a reason for not getting their children immunized. One mother mentioned that she was able to get a smallpox vaccination for her child because the vaccinator came to the market, but that she could not get other vaccinations because she could not leave her work to go to a health center or hospital (Adekunle, 1978).

If the mother works, a number of related issues become important for analysis. One factor is the availability of mother substitutes. If older children become responsible for the care of the younger ones, the quality of the care may deteriorate because the older siblings have little knowledge of disease and symptoms or are physically unable to take a younger child to a doctor. Second, the compatibility of the mother's job with the task of using health services for either herself or her children is a crucial issue. Her hours might be long and inflexible, or she might have to travel a long distance to and from work. Time allocation studies have consistently demonstrated the lack of free time common to low-income women, which must be taken into account in planning health programs for women (Popkin and Solon, 1976).

If, for example, some households are constrained by work patterns, but government health facilities are available only during the usual

working hours, then the families will be driven to modern or traditional private facilities, notwithstanding the influence of price, income, or any of the other variables. It may be that the flexibility of hours of traditional services is a critical element in their greater use (Uyanga, 1979).

Table 32 gives results for the 1981 survey of health facilities in the Philippines. Public clinics appear to have had the least flexible hours by far; in addition to the relatively short hours, 94 percent had no services available after regular hours. In comparison 82 percent of private doctors and 98 percent of traditional healers either were always open, responded to all calls, or were available after regular office hours.

Information related to time allocation issues may be implicitly captured in a person's estimation of individual opportunity cost (one's labor supply curve). Yet information about the physical limitations that available jobs impose, such as the distance to work, the degree of flexibility of hours, and the number and length of work breaks, can contribute additional knowledge about a household's capacity to use medical services. Breast-feeding studies have found a significant reduction in the duration of breast-feeding for women who work away from home (Akin et al., 1981a; Popkin, 1978).

HEALTH NEEDS

Physiological

People seek medical care in reaction to a perceived need. While some of these needs are psychological, many are because of physical symptoms that can be readily and objectively identified. The overwhelming place of simple

TABLE 32. Clinic Hours in a Rural Area--the Philippines

Hours per Week	% Public	% Private	% Traditional
No hours but responds to all calls	0	15	93
0-40 hours	88*	23	2
41-168 hours	12**	62	6
	100%	100%	100%

* All of these were open from 38-40 hours a week.
** All of these were open from 44-45 hours a week.

Source: Griffin et al. (1981).

physiological need in the demand for health services is evidenced by the fact that health professionals and morbidity statistics are often the only sources consulted when health services are being designed.

A number of physiological conditions can affect health service usage. At the household level, the existence of pregnant women and young children implies certain objective needs that may become articulated as demand for prenatal, obstetrical, and well-baby care. In addition, household diet and nutritional status represent crucial physical considerations that affect health needs. Malnutrition not only reduces health status independently but also works synergistically with other diseases, such as diarrhea in children, to raise the level of physiological need. In contrast, a household's previous commitment to preventive care, as evidenced by its immunization record, would result in less physiological need today. People are also driven to the doctor by accidents and degenerative diseases, both of which are relatively more important in high income countries. Household health needs will tend to increase if wage earners are employed in hazardous occupations or in areas of high morbidity away from the home, and if there are old people present in the household.

Because intestinal parasites, infections, and vector-borne diseases are transmitted through contact with other people, through unclean water, or are localized by geography, the health status of the household is intimately tied to community conditions. Diseases such as malaria, sleeping sickness, Chagas' disease, schistosomiasis, and river blindness require the existence of a specific vector to be transmitted. Dry areas are not susceptible to schistosomiasis because of a lack of snails; similarly, (at least in the past) malaria is not a major problem where DDT is used to control the mosquito population. Community morbidity data, which gives

a rough, average measure of health status, are useful to approximate the differences in environments and provide some measure of community-level need.

In a sense this section merely argues that the individual characteristics (age, sex, parity, etc.) of household members are important determinants of health service use. An important implication to be drawn is that even though health status of individuals should be measured or estimated, it is affected by both household and community characteristics.

Perception of Need

Even when it can be ascertained that a person is suffering from the symptoms of a physical disorder, the decision to seek professional help and the subsequent choice of provider are matters partially determined by the individual's psychological and cultural predisposition. Symptoms that might occasion panic in one culture or by one person may go unnoticed in another culture or by a different individual. The role of individual perception of need is quite important and, in the extremes, can result either in hypochondria or in total refusal to seek help when ill.

It has been repeatedly observed that in low income countries there is very little attention paid to illness, simply because almost everyone is suffering from some sort of disorder. In Zaire, for example, hookworm is so common that it is rarely reported as an illness, and the level of morbidity is so high that patients at one hospital were found to be suffering from an average of 2.7 diseases (Lashman, 1975). This type of situation is often attributed to the "economic fatalism of poverty," thought to make people present-oriented and ready to accept disaster as inevitable and uncontrollable. As a consequence, it is suggested, there is little preceived need for preventive care and there is a strong element of acceptance

of fate in the reaction to accidents and sickness. Whether this explanation is reasonable is difficult to prove, but it probably can be said that in many low income populations, where people are suffering from malnutrition and are hobbled by constant exposure to parasitic and infectious diseases, it is difficult to identify when a person is sick enough actually to be labeled "sick." In rural Ethiopia, for instance, the common definition of sick is when a person has to lie down and rest during the usual slow-moving day (Messing, 1970).

A few studies have attempted to analyze the way perceptions affect the reaction to disease. Gesler (1979) found the perceived severity of an illness, measured by the reported length of the disorder, varied by ethnic group and socioeconomic status.

Mothers from high status socioeconomic groups reported longer periods of illness for their children than did mothers from poorer households. It is doubtful that the wealthier children were actually sicker than the poorer ones, only that their mothers were either more aware of their conditions or that they knew that something could be done to help the children. Akin et al. (1981b) observed a similar situation in the Philippines, where the reported number of sick children was positively related to the income of the household. The highest income quintile accounted for approximately 30 percent of the sick children, and the lowest accounted for only 15 percent.

Uyanga (1979) attempted to determine whether the types of symptoms a patient perceives leads him to a specific type of native practitioner. He found that for Southeastern Nigeria, 53 percent of the patients of native doctors and 78 percent of the patients at spiritual healing homes were suffering from infertility, childbirth problems, mental problems,

witchcraft, disorders of the stomach, and diseases of supernatural etiology. Uyanga noted that "many of those who complained of infertility, mental problems, and diseases of the stomach also saw themselves as victims of enemy machination and supernatural powers" (page 327). He attributed the continued use of traditional forms of medicine in the presence of modern alternatives, at least in part, to the inability of modern medicine to address these types of illnesses at the level of perception characteristic of the patient.

An analysis of data gathered from almost 9,000 households in Guatemala in 1965 attempted to measure the difference between real and perceived health needs. Approximately 39 percent of the sample reported having felt ill or suffered accidents in the two weeks prior to the survey. Using results from a hemocrit test on a 10 percent subsample of 5,026 individuals, 1,252 members of this group (25 percent) were found to be suffering from anemia (using the most conservative definition of anemia for the hemocrit test). Of these, 41 percent had actually reported being ill in the household survey, and the other 59 percent had reported no illness. Anemia among children was even less noticed. About 73 percent of the anemic children (ages 2-11) had been reported as being healthy by their parents (Myers, 1982).

It is not clear how to control for perception of need in a fully specified demand system. The examples cited above suggest that perceived need is related to socioeconomic status, ethnicity, and probably such variables as education. Heller (1976) used ethnic variables to identify whether a patient was Chinese, Indian, or Malay, as a way to get at these differences. The results seemed to indicate a significantly higher total number of visits to all practitioners as well as a preference for traditional practitioners by the Chinese population. What exactly was measured by these

variables, and what the results meant, is difficult to interpret; yet there is little doubt that whatever the label, individual or culturally induced perceptions about health are important determinants of demand.

DEMOGRAPHIC ISSUES

Sex

Many cultures practice sexual discrimination against women. At the household level they may lead to fewer immunizations for girl babies because of a low perception of their value to the household, an allocation of scarce food and medical resources away from females in order to ensure an adequate diet and good health for males, and possibly even a shorter and less intense effort to breast-feed girl babies. In such societies a girl child in a household may not only be more prone to illness than a boy baby but also may be less likely to be taken to a physician when ill (Levinson, 1974). By similar reasoning, older females in the household may be less likely to use all types of scarce medical resources than the men, other things equal.

The choice of type of medical facility may also be influenced by the sex of the patient. Apart from the fact that some clinics, such as maternity and family planning centers, tend to serve one sex exclusively, parents may seek out higher quality, more expensive care for males than for females.

Nevertheless, there are physical factors which may overwhelm this cultural bias against women in the demand for health care. Women in the middle years (barring pregnancy) tend to be healthier than men, and women also tend to live longer (Preston, 1976). Thus middle-age women may

actually require less medical attention than their male contemporaries, while older women may monopolize curative facilities because they have few male age contemporaries. As a consequence, it is difficult to generalize about the effect of sex on demand, unless all other factors (such as health status and age) are also considered.

Attempts to isolate the effect of sex on use of medical care have yielded weak results. Heller (1976) discovered that Malaysian households provided less outpatient care to boys (0-4) than to girls but felt that this result may have been more an indication of the low health status of the females than of a greater willingness to seek care on their behalf. A survey in the Maharashtra State of India found that a greater fraction of sick boys than ailing girls under the age of 15 received any treatment. Female babies tended to be brought to hospitals or doctors for treatment at a later stage of illness than were male babies (Coyaji, 1981).

A study in rural Bangladesh found that diarrheal incidence among male children in the 0-4 age group was 10 percent greater than for female children. Although all study households were eligible to receive free treatment of diarrheal diseases, there were 66 percent more consultations undertaken for the males in this age group than for the females. Similar patterns of use were found for the 5-14 and over-45 age groups, although the differences were less severe. For the 15-44 age group, however, there was approximately 26 percent greater usage by females than by males. Thus, for the youngsters there seems to have been a definite bias in the households against providing the free care to girls, but the results for older people suggest that other factors may have come into play (Chen et al., 1981).

A compilation of surveys in Thailand (Porapakkam, 1981) found that

women consistently reported a slightly higher level of morbidity than men, even though Thai women had a mean life expectancy about five years longer than men. These two pieces of evidence may imply that women were not actually sicker than men, but tended to report illnesses more often. A survey in Chile revealed that high income women accounted for more physician visits than any other group. Males up to the age of 14 were the next most frequent users of physicians' services (Reineke, 1976). These findings might suggest that there are differences in the attention paid to male and female children; however, value of time, educational levels, and income have important counteracting effects as the children age. In India, however, an analysis of 100 government health centers showed that male patients of all ages outnumbered women by about five to one. This figure excluded visits to maternal and child health clinics, and therefore may have questionable validity (Murthy, 1981). In Nigeria, 72 percent of the native doctors' patients were females, but 49 percent of the patients in spiritual healing homes were women (Uyanga, 1979). Although no attempt was made to analyze these results, other data suggests that this large differential may have been due to a preference in the study area for native doctors to treat reproductive-related problems.

Currently, there is probably no more explosive or more analyzed issue in economic development than the role of women. Yet there are weaknesses in analysis based on frequencies by sex; in fact, such simple correlations can be quite misleading. For example, none of the statistics cited above (except the Indian and Bangladesh studies) show more than marginal differences in usage by sex, and there is no guarantee that the reported differences are not due to chance, or that sex would not be eliminated as a significant explanatory variable in the presence of other factors such as

income, distance, and education. Heller's (1976) analysis based on a more completely specified model found a (small) statistically significant effect for sex for only one age cohort. Similarly, the analysis of health services demand in the Philippines (Akin et al., 1981b) found sex was not a significant explanatory factor for children.

As weak as the empirical results often are, the reasons for expecting them to follow certain patterns tend to be treated as self-evident truisms. Differences in health service usage by men and women are assumed to be caused by sexual discrimination, not physical differences, or by the fact that women do not use modern facilities because the service providers are male (U.S. Department of Health, Education, and Welfare, 1979). The only attempt to examine this latter issue concluded that health centers with female doctors had no greater ratio of female to male patients than did other centers (Murthy, 1981).

To conclude, sexual discrimination is an undeniable element of life, but proper analysis requires that there be an attempt at causal explanation (or hypothesizing) and that a great amount of care be taken with the data that is used. The past research results have not been of sufficient strength to provide much insight into the effects of sex on service use.

Age

Theoretically, there should be a U-shaped relationship between health care use and age. Infants and preschoolers are usually more vulnerable to disease because of their immature immunological systems and greater growth needs. Preventive care treatments such as immunization have been designed to address their needs. Accordingly, preschoolers would be expected to have a high level of use of health services both because of their

susceptibility to infectious disease and because some services are designed specifically for them.

If children survive these years, the need for outpatient care is expected to fall until degenerative diseases begin later in life, and the need for care once again increases. Exactly the reverse pattern should hold for the special case of the obstetrical and gynecological needs of women. The requirement for obstetrical care should start at a low level, increase as women become adults, and decline again as they get old.

Thus the age of the individual probably carries with it no great sociological or economic significance except to the extent that the very young and the very old are dependent on other people to ensure that they are properly cared for. Age is a biological datum which measures the vitality of the organism and governs the probability that certain age-specific types of care will be needed, or that age-specific facilities will be used (e.g., maternal and child clinics).

Household Size

It is not obvious what effect household size will have on either the demand for medical services on the choice of provider. Household size is in part an income issue (e.g., the extent to which household income should be deflated for family size), but it is also hypothesized to have direct effects on household health. Both aspects of the problem tend to be related but should also have independent effects.

On the one hand, a larger household's resources must be shared with more people. This may result in lower levels of nutrition for each resident, less consumption of health care per person, and a reduced ability to meet individual needs of children (Popkin and Solon, 1976). On the other

hand, economies of scale may be important in large families and be such that the marginal productivity of home production is high enough for the mother to drop out of the work force and stay home. Larger families may elicit greater work effort or longer hours on the part of the father, will almost certainly increase the amount of time available from all members for household production, will tend to provide older children and a larger number of adults as mother substitutes (Popkin and Horowitz, 1978), and will tend to contain more people who can supplement household income. It is these competing forces--the additional costs occasioned by more dependents and the greater potential for all types of income--that make the effects of household size on health care demand unclear.

Kelley (1976) used early U.S. data and found that the income effects tend to outweigh the cost effects so that total per capita family income tended to rise with the size of the household. If this predominance of the income effect is true in general, larger households may be expected to behave with respect to health care demand as if they have higher incomes than those that are measured for them.

Apart from the economic effects of family size, certain biological effects may contribute to a higher level of health need. For the mother, repeated pregnancies naturally have a direct positive impact on her need for medical services. There is also an indirect positive impact on household need because the more pregnancies the mother encounters, the greater is the physical risk to both her and the child. Having more children may also be associated with having shorter periods of breastfeeding (Heller and Drake, 1979) and greater crowding in the household. The associated increases in physical risk may reduce maternal and infant strength and raise the probability of infection for all members of the

household, although documentation of these relationships has been difficult (Cassel, 1971).

In the Malaysian analysis previously cited (Heller, 1976), gross household income had only a minor impact on the total household consumption of outpatient visits. Yet in another approach based on the same data, but using per capita household income, the mean number of outpatient visits was 1.3 for the lowest income quintile and 2.1 visits for the highest quintile (Heller, 1976). For both measures of income there was a strong positive effect on the consumption of preventive services, more of a discretionary purchase than regular outpatient services.

Household Structure

The way households are organized and the recognized lines of authority within them can vary quite radically across countries, and even across households within a country where traditional and modern sectors as well as various ethnic groupings coexist. A household's organization may affect family health and its ability to use health care services.

An issue connected with household organization is the authority of the mother vis-a-vis the father. The relative degree of authority of the mother may affect the amount of attention paid to maternal and well-baby care, as well as the amount of stress placed on out-of-pocket costs relative to the mother's opportunity cost of utilizing services. The position of the mother is likely to be determined by her education relative to the husband's, whether she works outside the household, the amount of income she earns, the number of wives the husband has (if this is an issue), whether the husband is present, and various intangible cultural values. Of particular interest for analysis is the female-headed household, in which health status

may be lower and time constraints greater. Recent evidence indicates that the number of female-headed households in low income countries ranges from 10 percent of all households in Nepal and Kuwait to over 40 percent in Panama and Botswana (Buvinic and Youssef, 1978).

At the opposite end of the spectrum from the female-headed household is the extended family, where there tends to be a strong emphasis on traditional roles and values because of the presence and authority of older people. Such households are expected to be slow to adopt new sanitary habits and health practices, and to prefer traditional forms of medical practice.

Very little evidence is available on the effects of family structure on health care demand. In Ibadan, Nigeria, where the men often are polygamous and the women have a long tradition of market work (85 percent are traders), 48 percent of the men and 43 percent of the women sampled did not think that the husband's permission was necessary before a child was taken to the hospital (Maclean, 1966). Heller (1976) found that adults older than 46 and children between 5 and 15 years of age were most likely to use traditional practitioners. While the former result was to be expected, the latter may have been due to household organization. The older adults may have been responsible in many cases for the care of these children, while the mother took care of the zero to four age group. This possible explanation is speculation, but the Heller result is certainly consistent with the hypothesis that household structure and the roles of the members of extended households may explain some of observed behavior in health care consumption.

KNOWLEDGE AND BELIEFS

Knowledge and beliefs about sickness, good health habits, living conditions, and medical practitioners are central determinants of the demand for health services. In the discussion below it is recognized that the two labels, knowledge and beliefs, represent overlapping phenomena that are probably simultaneously determined. They are separated in this section in order to make a distinction between the effects of education (or new information) and culturally derived values (or beliefs). Even though much of the following discussion is focused on the mother as the primary implementer of health policies in the family, it is recognized that other household members and the community play an important role.

Education and Information

One of the best-documented and least understood phenomena in health economics is the independent, positive effect of education on health status and life expectancy (Cochrane et al., 1980). Education is correlated with many of the variables discussed in this review, particularly income, wealth, urban-rural residence, social class, and the demographic variables; nevertheless, the independent effects of each variable should be sorted out. The theory of household production treats education in the same way that basic microeconomic theory treats technical change. It is viewed as allowing more outputs to be produced from a given set of inputs. Beyond that generalization, little is known about the exact manner in which education actually differs (Michael, 1972).

It is plausible, however, to hypothesize that more highly educated people have higher expectations for their lives, eat higher quality

diets, are more skilled at engaging in market activities, and exhibit greater efficiency in performing household tasks (Welch, 1970). Education also may enhance the ability to cope with day-to-day problems, to be able to understand scientific cause-and-effect reasoning, and to be able to plan for the future. Okediji (1975) suggests that education may also affect whether a household's drinking water is boiled, whether the household is sensitive to dirty cooking utensils, and whether human waste (in the absence of toilet facilities) is systematically disposed of away from the residence or haphazardly deposited almost anywhere. These characteristics suggest that the more highly educated household will not only be healthier but also will have more time and desire to use health services.

In this context the mother's education is probably of great importance because she usually supervises household production. Her skills and attitudes are especially important to the well-being of her children, particularly babies. Battad (1979) found that Filipino women with high levels of education bought more calories and protein per peso of food expenditure than their less educated contemporaries, a finding consistent with the idea that education leads to more efficient use of inputs.

In addition, educated mothers are expected to be more likely to seek out an education for their children. Added education for children, in turn, may improve health directly, because children often receive immunizations, food, and medical attention at school. Additional education for children may also compound the indirect benefits of the mother's education, because the children learn more about health and also become more efficient in household production. All of these effects are of a long-run nature, however. Beyond these beneficial consequences of education for family health status, education may also contribute to the choice of health

practitioner. More highly educated families will tend to have acquired a more scientific knowledge of disease, symptoms, and the importance of immunizations. They probably will also have been exposed to Western thought and have become more willing to use modern medical services. Lasker (1981) found a high correlation between education and whether an individual gave a "scientific" response to questions on the cause of disease[12] and methods of prevention[13] in her up-country Ivory Coast study. Of those with some education, 74 percent gave a scientific response for the cause of disease and 55 percent gave a scientific response for methods of prevention. Of those with no education, the percentages were 26 and 34 respectively. Access to modern facilities was also highly correlated with the scientific content of these responses, which may indicate that this information was being disseminated to people through the modern facilities and was understood by them, notwithstanding low education levels.

Very few studies have attempted to test these propositions on education directly. Heller (1976) deleted any reference to education from his model. Akin et al. (1981b) used the mother's level of education as a variable, and found it important in determining where a sick child was taken for treatment. The least educated mothers relied on self-treatment in 45 percent of the cases. This percentage declined to about 30 percent for the most highly educated mothers. In contrast, the group of mothers with the highest education used private modern practitioners in over 50 percent of the cases. The least educated mothers chose this source only 25 percent of the time. The use of traditional practitioners declined as years of schooling increased; public facilities were found to be favored by those with middle levels of education.

Data from Ibadan, Nigeria, also provide glimpses of the effects of

education (Okediji, 1975). Okediji hypothesized that there was a link between the status of parents and the connection they made between the health of the family and the level of environmental sanitation. Two samples were taken, one from an elite residential area of the city and another from an extremely poor part of the city. Only 13 percent of the nonelites were aware of any connection between sanitation and health. In contrast, 100 percent of the elites were aware that a connection existed. Of the nonelites aware of the connection, all had completed at least a primary education and accounted for about one-half of all the nonelites who had attended school at all.

Okediji also found all heads of nonelite households who were aware of immunization campaigns or had received immunizations had formal educations. Again, 100 percent of the elites had heard of the campaigns and had immunization campaigns or had received immunizations, had benefitted from formal educations. Again, 100 percent of the elites had heard of the campaigns and had received immunizations. In addition, educated nonelites were much more

It is repeatedly stated in the anthropology, sociology, and public health literature that people in low income countries are rational in their approach to life. When faced with proof that a new approach is better, they will use it. Imperato (1974) described an attempt in 1968 to immunize nomads in the West Africa sahel against smallpox and measles. A lower rate of coverage was achieved with the nomads than with the sedentary population despite the use of expensive mobile teams to reach them. The lower coverage was caused by resistance to being injected, not by failure to locate the nomads. However, when a second campaign was mounted two years later, mobile teams which had been dispatched were recalled. On hearing of the campaign, nomads "traveled scores of miles from their routes in order to be

immunized. When questioned why they had come, they all stated that they had seen smallpox disappear after the visits of the medical teams two years before and had seen measles occur only among those children not immunized" (Imperato, 1974, pp. 456-57). Similarly, in Ethiopia and other cultures, the effectiveness of immunizations and penicillin has been so widely demonstrated that sick people demand injections for all types of health problems (Messing, 1973; O'Connor, 1980). To a pragmatic people, successful experiences can replace formal education as a device for encouraging the adoption of new practices. However, Lieban (1976) notes that it may be difficult for people who mix practitioners to identify who is responsible (if anyone) for effecting the cure; thus it is possible that all that is learned from seeing a number of different practitioners is that mixing practitioners is effective, not that any one of them is better. A related issue is whether health-related education given over the airways, through specific campaigns, or as a part of the routine in public clinics, can have any substantial effect on changing perceptions The testing of village health workers in Afghanistan revealed an extremely low level of medical awareness before their training commenced. An average score of 41.3 percent was acheived on a 20-question oral examination. After the three-week training program, the average score improved to 83.9 percent, and when the same questions were administered three months later, a mean score of 86.6 was achieved. Although this surely was not a perfect experiment, it does indicate that the basic elements of a health education can be learned quickly and be retained (O'Connor, 1980).

We documented the pervasiveness of self-treatment as a source of care in chapter 2. If the Akin et al. (1981) observation that self-treatment behavior is dominant in the least educated households, and the O'Connor

(1980) experience with the high degree of awareness achieved with a small amount of health education are added to this, the potential benefits to better health of health education programs become potentially enormous. The inference made on the basis of the Lasker article earlier in this section (that proximity to medical facilities may have increased the "scientific" content of perceptions) lends credence to the expectation that information on health practices can alter attitudes about prevention and disease, even in uneducated households.

An experience in Ehtiopia, however, suggests that some caution should be exercised with respect to the ability of education alone to change behavior. A survey was conducted in an Ethiopian community which had a health center; this village was paired with a control community which had no health center. After about three years of exposure to the health center, inhabitants of the experimental community were far more likely than their control counterparts to realize that boiling water was a good idea. Nevertheless, very few people actually boiled their water because high fuel prices prevented it, proper containers were not available, and boiling water was not a customary procedure. Other attitudinal changes were observed on the importance of immunizations, the existence of intestinal parasites, and the desirability of a protected water supply. It was not clear, however, that these attitudinal changes in the vicinity of the health center had resulted in the appropriate actions or led to an improved health status in the village (Spruyt et al., 1967).

Because education does not have to come from formal sources, exposure to the radio, television, newspapers, and magazines can impart knowledge of modern medical practices, good hygiene, and available health services to the listeners and readers. Such exposure may also have the potentially

undesirable effect of subjecting individuals to advertising for health-related products and food items which may not be conducive to better health practices. The media might also induce people to plant new crops and change cultivation techniques, as well as provide information on consumption durables. Such information could lead indirectly to better health. The actual net effect of the media on medical care use is both unknown and practically untested, however.

The above discussion indicates both the complexity and great potential of education as an explanatory variable and as a tool of public policy. While it is doubtful that all of the effects mentioned here can be tested directly, it is desirable to disaggregate the education variable as much as possible in order to isolate its component effects. Education is obviously one of the most important variables, and it merits detailed analysis with respect to its role in the demand for health services.

Beliefs/Cultural Effects

The education/knowledge/information determinant interacts with other ideas classified here as culturally determined health needs. Knowledge and information modify beliefs and change tastes, leading to new kinds of behavior. It is important to add, however, that health beliefs and attitudes are not always clearly linked with behavior.

Although several anthropological studies of resource utilization have shown how beliefs affect use (see the section on substitutes) either directly or indirectly, they have also shown the opposite--that beliefs lag behind changes in behavior. Illness behavior may change to include the use of modern medical services even though illness beliefs, especially etiological concepts, may not. In part, this is a reflection of people's pragmatism.

Woods (1977) and Woods and Graves (1973) have investigated this phenomenon in a study of usage patterns in San Lucas Toliman, Guatemala. They attempted to develop a "causal processual model" which treats the modification of beliefs as a sequential process beginning with involvement in the cash economy, which leads to increased exposure to the outside world, which fosters a predisposition to innovativeness, which results in changes in medical behavior, which then influences medical beliefs that are incompatible with the modern practices. This is represented in the following diagram:

Cash-----→Exposure-----→Innovativeness-----→Practices-----→Beliefs.

In this scheme traditional beliefs are thought to be resistent to modification until they are found to be incompatible with previously made changes in behavior. The elements of the belief system that remain compatible with behavior go unchanged. Woods (1977) identifies the persistence of traditional beliefs as the most wide-spread reason for the continued use of folk practitioners. The situation may be more complicated than this discussion implies, however. Lieban (1976) found that modern and traditional disease classification systems may overlap in such a way that the patient can attribute success to the wrong practitioner or at least can interpret what has happened within the existing belief system.

For example, Lieban relates the incident of a mother who took her sick daughter to a traditional practitioner, who prescribed that a Mass be said to rid the coughing child of the troubling effects of her deceased grandfather's spirits. Later, after the Mass had been said (at a cost of 31 pesos, or about $3.90 at today's exchange rate), the child was taken

to a physician, where she was treated for tuberculosis (at an additional cost of 37 pesos, or $4.62) and quickly improved. At the mother's option, the improvement could have been attributed to the Mass, the pediatrician's injections of streptomycin, or the combination. Similarly, this approach can disguise failure. If a sick person is taken to the hospital as the final effort in a long series of treatment choices, and he dies, the hospital may be blamed for the failure even though the true reason for the death was the previous series of ineffectual treatments which allowed the illness to get past the point that the hospital could treat it. The interaction of beliefs and experience can therefore lead to unexpected types of learning (or interpretations of causality). Consequently, the provision of new medical services may lead to very slow changes in medical care consumption patterns and even slower changes, if any, in the accompanying belief system.

The research reviewed below has documented the existence of medically related beliefs. Few studies, however, have linked them to health-seeking behavior; judging from the foregoing evidence, that would be difficult to do in many cases.

Belief patterns exist for each phase of the life cycle. Pregnancy, for instance, is an easily recognizable condition in any culture. Whether it causes a woman to seek out nutritional counseling or obstetrical care, and where she seeks it, depends on her beliefs, traditions, and exposure to alternatives. Her child's health after delivery is directly affected by her beliefs about breast-feeding but also by her awareness of immunization services and her ability to recognize and react to symptoms. Beliefs, be they related to religious precepts (e.g., Mennonite laws concerning blood transfusions) or cultural practices, can govern the type of medical

treatment sought, the perception of health needs (see discussion earlier), and the general level of health in the household. The power of beliefs is suggested by a survey of medical personnel employed throughout the Ivory Coast and of nursing and midwifery students in the same country. About 60 percent of the sampled personnel and 75 percent of the students--the very people to whom modern medicine whould have been most familiar and accessible--reported they used African medicines for some illnesses (Lasker, 1981).

In Latin America, the belief system is based on the humoral scheme of hot and cold. This partially influences an individual's diet, diagnosis of disease, choice of medical treatment (U.S. Department of Health, Education, and Welfare, 1979), and compliance with treatments. Whether a patient follows a prescribed modern treatment may be influenced by his hot-cold beliefs. Several studies have also shown that "hot" modern medicines have been assigned classifications and integrated into the humoral system (Cosminsky, 1975; Logan, 1973).

Middle Eastern medicine follows a scheme in which the disease or injury itself is taken as a symptom of causal action by another agent, usually spiritual (U.S. Department of Health, Education, and Welfare, 1979). In either case the ability of individuals who believe in these systems to adjust to the practices of modern medicine is quite circumscribed unless belief is modified by education or experience. Several examples may be instructive. In Morocco women tended to go to the hospital for the delivery of their first child because they knew it to be safe. Still they preferred traditional obstetrical practices and tended to stay home for subsequent births (Weissman, 1977a). In Botswana women also delivered at home even when a hospital or clinic was available because childbirth was thought to

be a family matter to be attended by mothers and grandmothers. One woman gave the popular sentiment, "If my daughter is delivered in the hospital, how will I learn to deliver babies?" (Pielemeier, 1975).

Childbirth, infant feeding, and weaning are practices bound up in traditions that are often extremely unhealthful. In the Middle East the pre-Islamic belief in djinns and evil spirits is quite strong, which leads people to shield and hide their children or to scar them to make them undesirable to the spirits (U.S. Department of Health, Education, and Welfare, 1979). In many countries infants tend to be breast-fed far too long (up to two years) and are often weaned on tea supplemented with low protein porridges (Cosminsky, 1972; Popkin, et al., 1982). Such practices contribute to the low level of health in these countries but are not easily changed. They lead to more sickness but probably reflect an outlook on life that is not consistent with a desire to use modern medical services.

A dissimilar but related problem is that patients must often cross cultural lines when they seek care at a modern establishment. It is well recognized even in high income countries that the position of the patient vis-à-vis the doctor is one of ignorance and dependence. The choice of doctor is highly dependent on feelings of trust, respect, and the ability of the doctor to communicate effectively with the patient. Educational, class, ethnic, and sexual gaps that might exist between the provider and patient would probably be much smaller between modern practitioners and the educated elite. In societies where modesty is a strong value, as in Latin America and the Middle East, female patients may be reluctant to be examined by a male physician or male medical personnel and may not use public health care services for that reason

alone. Often traditional practices accommodate to the modesty of patients. This is particularly true with respect to the traditional birthing process (Cosminsky, 1972).

The most obvious type of communication barrier is language. In many areas, the doctor or other medical person does not speak the patient's native language and vice versa, and a native assistant is used as a translator. This barrier makes only a minimum of communication possible. The patient may present a short or incomplete description of his symptoms, which may affect the diagnosis. He may not understand the treatment instructions, as well as the medical terminology often used by physicians. Pride, shame, and embarrassment prevent the patient from admitting ignorance and asking for an explanation. The medical personnel, on the other hand, do not understand or know native illness concepts (e.g., the hot-cold theory). In contrast, indigenous practitioners provide and share diagnoses in culturally and linguistically acceptable ways.*

In Morocco, healing and health have traditionally been the responsibility of the women, but modern practitioners tend to be French-educated and male. In going to a modern doctor, women face not only the language barrier but also must give up another bit of their authority to men in an already male-dominated society (Weissman, 1977a). This is not an unusual problem. In Ghana, less than half of the physicians are natives; two-thirds are expatriates in Lesotho (Beamer and Gangloff, 1974; Pielemeier, 1975). Few low income countries educate an adequate number of health professionals and thus depend on foreign doctors.

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* Sheila Cosminsky, personal communication, April 20, 1982.

Traditional societies have typically depended on the practice of divination to find out what is wrong when a person is sick. Yoruba diviners in Nigeria, for instance, ask questions of the patient concerning the circumstances of the onset of the illness, not about the disease itself. The diviner then explains to the patient what is wrong. Among the Zulu of South Africa, the diviner is usually consulted by relatives, and the sick person stays home. The diviner is thought to need no information about the illness or the symptoms because human interpretation of these could be misleading. Rather, her second sight is depended on to see beyond ordinary human perceptions and to get at the real cause of the malady (Ngubane, 1981, p. 62).

When an individual has grown up in a culture where this or a similar approach is commonly used, and he goes to a modern doctor who asks, "What is the matter with you?" he naturally is shocked and takes this statement as a confession of incompetence by the doctor (Maclean, 1966). An analagous experience would be a sick individual from a high income country going to a doctor and having the diagnosis magically whistled from the rafters, a form of divination which commands a premium price in South Africa (Ngubane, 1981).

Similarly, people develop certain role expectations of the physician. In Guatemala, for example, people expect an examination, including the use of the stethoscope. If the doctor does not perform an examination (possibly due to time pressure or because he feels it is unnecessary) but only prescribes some medication, the patient feels cheated. He expects to receive an examination, with the use of medical technology (the symbols of modern medicine), and expects the physician to play the role of an illness specialist, not merely a dispenser of medicines. Often patients

in a government clinic do not even see a doctor but must describe their symptoms to a midwife or a nurse. Young (1981) reported that this type of care was looked upon as being of low quality; one patient described the nurses as being "maids."

Often modern practitioners do not realize the extent to which illness in a traditional culture is a social phenomenon. Consulting with relatives and friends before making treatment decisions is a common practice. Similarly, ancillary people are involved in treatment compliance decisions and as a social support network during an illness; in traditional practices they are often directly involved in the cure. In Guatemala, for instance, the family participates in the healing ceremonies through confession and by sharing a meal. For the patient to rely completely on the advice of a doctor and ignore the traditional involvement of these other people may result in social sanctions or pressures of various kinds. Yet doctors typically presume a one-to-one professional relationship with the patient, which may cause social problems for the patient but also undermine the effectiveness of the treatment regime (Cosminsky*; Janzen, 1978)

The social distance and communication barriers which exist at the clinic or hospital may cause the patient to be anxious above and beyond the usual physically-induced anxiety one encounters during an illness, and thus avoid the facility as much as possible. Anxiety may also be engendered by not taking the advice of kin or neighbors.

Anxiety may also be caused by the use of a traditional practitioner, but this anxiety would be because of factors different from those that cause fear of the modern system. The traditional healer is usually believed

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* Sheila Cosminsky, personal communication, April 20, 1982.

to have relations with the supernatural world and may attribute or divine the cause of the illness as witchcraft or the patient's breaking of some taboo. In Guatemala, some people put off going to a traditional healer because of the implications involved if the cause would be attributed to witchcraft (social conflict) or to breaking a taboo or not fulfilling a promise to a saint, God, or Jesus. They would rather not know; so they see the traditional practitioner when they can no longer cope with the illness and the question of ultimate causation becomes relevant (Cosminsky 1972, 1977b).

Another medical practice closely associated with beliefs is the use of charms to protect people. In 1970, approximatley 70 percent of the children attending a Tanzanian maternal and child health clinic wore an amulet or charm purchased from a traditional healer to provide protection from disease. A nearby mission hospital was known for cutting these amulets off for being an anti-Christian practice; the mothers merely learned to hide the amulet on their own clothes instead of putting it on the child (Freeman, 1981).

URBANIZATION

The general phenomenon of urbanization was thought to have caused a higher level of disease and a shorter life for people crowded into cities during the Industrial Revolution in England (Habakkuk, 1965). In low income countries today, the situation is reversed. Urban residents generally are the only ones who have access to treated water, public sewage systems, and regular garbage removal (Preston, 1979). In addition, there is greater availability of all kinds of high quality health services in cities,

particularly hospital-based ones, than in rural areas. There also tend to be more employment opportunities outside the home (at least for men), fewer traditional family units, more exposure to modern life styles, better control over disease vectors, and a greater reliance on money income (Cantrelle, 1975). Some of the negative health effects of city life include crowding, exposure to accidents, the high level of tension, pollution, new occupational hazards, and need for adaptation (Cassel, 1971).

Nearly all of these ideas have been discussed directly elsewhere in this review; so if they are controlled for at the household level, the question is what an urban/rural variable would explain, by itself, about the demand for health services. The answer is unknown, but it may well be that "urban" is a measure of the efficiency with which household consumption and production are undertaken. In urban areas specialization is stronger, markets are wider, and markets are more widely used; so the time required to perform household tasks may be lower and choices wider than in rural areas.

Another possibility is that "urban" is a proxy for the characteristics of urban migrants. Urban migrants are a self-selected group and tend to be the healthiest individuals in the rural areas from which they come. The majority of urban immigrants are males between 15 and 24 years of age, have higher average educations than other rural residents, and are absorbed quickly into the informal sector labor force (Yap, 1977). They also seem to be much more adaptable to modern medical concepts. A 1967 survey in Lagos, Nigeria, found that the shorter a person's residence in the city, the more likely he was to have been vaccinated, even when distance to the health center, ethnicity, and age were partially controlled for (Morgan, 1973). Another analysis indicated, although less strongly, that the new

residents understood the communicability of smallpox better than longer-term residents (Morgan, 1973). A study in Tehran, Iran, compared the health behavior of a sample of migrants with that of a sample of nonmigrant residents. The migrants were slightly more likely to be ill and slightly less likely to use health services, but these characteristics were apparently more because of occupational status than migratory status (the two, of course, are related). The one clear finding of this study was that migrant females reported a level of morbidity approximately a third higher than any other group (migrant males, nonmigrant males, nonmigrant females); this may have been because of the extraordinary change of status and social life the women had to undergo in moving to the city (Stromberg et al., 1974). Another study which compared the characteristics of a rural sample with a sample of urban migrants found a similar problem of adaptation among single urban female migrants (Benyoussef et al., 1976).

Since migration to Third World cities has increased dramatically in the last 20 years (Preston, 1979), many if not most of the people labeled "urban" in a study would actually be fairly recent migrants. The urban variable would therefore be a proxy for the so-called migrant personality if most of the other urban-related variables (distance, education, etc.) were controlled for. As a consequence, it might be preferable to substitute "length of residence in the city" or some similar variable for what is usually measured as "urban."

To conclude, in a well-specified model, the urban variable would probably represent an efficiency variable. In less perfect models, it could represent all sorts of different factors and would be hard to interpret. The latter situation is common.

SEASONAL ISSUES

Seasonal changes in precipitation and temperature have important effects on the food supply, morbidity, and nutrition in rural areas. Seasons also affect economic variables such as the price of food, monthly income, the availability of cash, and time constraints (Chambers et al., 1979).

In Ghana, for instance, skin infections, disease vectors, and the enervating effects of the hot, humid climate predominate during the wet season (March to October). At this same time, health services are at their least accessible because roads tend to become impassible (Beamer and Gangloff, 1974). A similar situation was observed in Senegal. The absence of tarred roads in the rural area under study made travel to health practitioners located outside the village virtually impossible during the monsoon period from May to October (Orubuloye and Caldwell, 1975).

In agricultural areas, the natural coincidence of low food supplies with the high energy requirements of a new harvest season can reduce disease resistance significantly. For example, there is a single harvest at the end of Ghana's wet season, but frequently food runs out right at harvest time, when energy demands are at their greatest. The intensity of the wet season also makes it difficult to store food safely, and there is almost no cash or market economy existent in rural areas to permit supplementation of the diet. In the dry season (from November to February), food stocks are high but dusty conditions raise the incidence of respiratory infections. Studies in Ghana have shown seasonal variations in adult weight of from one to five pounds in the highlands, but less in the lowlands and coastal areas (see Hamilton et al., 1981). Evidence from a nutritional survey in Botswana shows marked, similar seasonal

variations in the quality and quantity of food consumed (Pielemeier, 1975).

Patterns such as these are widespread. There are large fluctuations in agricultural work patterns, especially in one-crop systems (Schofield, 1979) and in areas dependent on rain-fed rice agriculture (Oshima, 1967). At peak agricultural times, work days may average 15 hours (Palmer, 1978) while at other times there may be so little to do that individuals and even entire households migrate temporarily to larger towns (Pielemeier, 1975). In susceptible areas, diarrheal diseases, guinea worm, malaria, and skin infections predominate during the wet season (Hamilton et al., 1981).

Because of these seasonal variations in morbidity, availability of cash, and time constraints, the use of medical services can vary quite substantially. When people are low on food, out of money, and have little to do, free government clinics might be attractive because of their low cash cost and the low level of time costs. Conversely, at harvest time the same people would have more cash as well as more substantial time constraints so might prefer private practitioners or rely on self-treatment. Data from Tanzania indicate that outpatient attendances at a fee-for-service private mission hospital peaked right after the harvest, and visits to a competing (no fee) government hospital reached their lowest level at the same time (van Etten, 1972). The more radical case of nomads, whose whole life is dictated by seasonal conditions, mimics this behavior (Imperato, 1974).

These seasonal effects have not been tested in a multivariate framework. Heller (1976) used a dummy variable for farming households to capture the effect of seasons on the variability of agricultural income. He did this only for inpatient stays, where the variable had a negative but statistically insignificant effect, and for maternity care, where it

had a significant negative impact on the probability of using a modern practitioner to attend a birth.

Unfortunately, it will not be possible to test the consequences of seasonal variations in this study. The Bicol data were collected during the dry season in the Philippines; so the season is already controlled for in the data (Popkin et al., 1979).

SUPPLY

The available supply of medical services is crucial to whether they can be used. If no medical care is available then obviously none can be effectively demanded.

Normally the supply, or relative scarcity, of a service is thought of as captured in its market price. However, the real price of physician services is often not known, and market prices may be distorted by coinsurance, public provision of the services, and other institutional constraints. Most often, therefore, an average price is used for each type of service, and a direct measure of availability (physicians per patient, hospital beds per patient) is used to define relative scarcity.
The other prices, such as transportation, time, and pharmaceutical costs, also must be averaged or estimated for people who did not use a specific service but who are assumed to have had the capacity to use it had they wanted to. Calculating a price for nonusers may not actually capture the true price to them if, because of unaccounted supply constraints, they were not even eligible to use the service. Were this the case, people who were precluded from using a service would not be differentiated from those who simply chose not to use it. This is an important consideration in low

income countries because the services of modern practitioners are not available everywhere and the costs of transporting oneself very far can be prohibitive (Heller, 1976).

Using some measure of availability, such as per capita government expenditures, the number of practitioners per capita, or the amount of practitioners' time available locally can partially compensate for this difficulty. Some measure of supply would also perform the usual econometric role of identifying the demand curve.

CONCLUSION

Taking the viewpoint that individuals behave rationally and that households can be treated as producers (rather than simply as consumers) of good health, this chapter has organized the determinants of health behavior into an economic framework. We have discussed each of these determinants in turn, and have tried to suggest hypotheses regarding each factor's effect on health-seeking behavior. Where possible, we have included evidence from other studies. Most of the work reviewed here has come from the noneconomic disciplines, especially from medical anthropology, geography, and sociology. Sledge-hammering these divergent sources into the framework of yet another discipline may have done considerable violence to the context and goals of the articles involved, but by providing a consistent framework for study in this area, the exercise may have been worthwhile.

For purposes of policy, analysis even at this level of generality provides insights that can suggest to planners slight changes in practices and focus that would measurably improve the delivery of health care in rural

areas. Some of these insights include the following:

1. Reviewing the whole specturm of costs associated with using health services should put to rest the idea that government services can be offered for free. At best, some of the costs associated with using these services can be reduced or eliminated; unavoidably, though, some will stay in place and continue to act as barriers to use. For planners, this situation requires that attention be paid to the specific costs that deter health care consumption by the intended beneficiaries of new services. It also suggests that there are a much broader array of policy initiatives in this area than are currently being pursued. There are numerous alternatives to the current preoccupation with the supply of practitioners and numbers of facilities that also could be used to reduce the cost of medical services for the rural poor (i.e., roads, insurance, use of pharmacists, etc.).
2. The complementary costs of modern care, namely drug costs and the requirement for return visits, can be quite burdensome. The supply of modern drugs is a particularly important problem (Gray, 1982, contains a vivid example) and should probably be solved before modern free care is extended to new areas. However, serious thought should be given to the revision of treatment regimes, drug prescriptions, test procedures, and the requirement for repeat visits--the whole system of modern medical practice that has been developed and designed for industrialized countries (King, 1966)--so that they can be made more appropriate to the constraints operating in low income rural areas.

3. Similarly, sensitivity to local work habits, availability of cash, customary payment practices, and beliefs can be crucial. Often small, inexpensive changes in hours or payment practices can significantly reduce tha real cost of medical care to specific households. In addition, there is a vast body of anthropological literature that can be used to explore ways that modern medicine can fit better into local belief systems. The perceived low quality of public clinics may be susceptible to changes in how they are presented and interpreted.
4. Often the problem planners have is how to "sell" modern services to rural residents--for instance, how to redirect demand from traditional sources to modern clinics and how to change certain traditional practices (e.g., childbirth). The evidence reviewed here would suggest the following:
   a. Offer narrowly defined services that take advantage of what modern medicine does best--immunizations, treating infectious diseases, treating parasites, and so on--in order to develop a reputation for high quality and to satisfy those who pragmatically search for a cure.
   b. Stop trying to change existing consumption patterns or health practices that are either beneficial or inconsequential; this can only be viewed as antagonistic.
   c. Take advantage of existing patterns. Often this is already done, especially in training midwives, but there are many more possibilities. The informal use of pharmacists and the dependence on self-treatment could be supplemented with pharmacist training programs and an effort to get certain basic drugs and supplies

stocked. Simplified instructions on drugs alone could improve the effectiveness of self-treatment.

Often clinics have a wealth of data at their disposal. These data may be formal medical records and survey information, or they may be less formal, such as experience with the usual health complaints people have, reasons for variations in work load, clients' economic status and social class, and knowledge of local practices and conditions. As this review shows, all of this knowledge can be used to get better control over what the clinic is used for and to come closer to solving the medical problems that, from a practical point of view, can feasibly be overcome given the quantity and quality of care that can be provided at the local level.

For analytical purposes, it should be noted that the treatment of the determinants in this chapter has been far more exhaustive and specific than could possibly be attained in statistical work. Many of the variables discussed are so closely related that, given the quantity of data available, the accuracy of the recall surveys that are used, the relatively small sample sizes of sick people that can be collected, and the limitations of computing facilities, decisions to limit the size and complexity of the models used must be made when estimations are carried out.

Moreover, this chapter has made no effort to speculate on the mathematical form the hypothesized relationships may take or to suggest ways the enumerated variables may interact with each other to determine demand. To some extent these issues are addressed in chapter 6, where we use Filipino data to estimate demand models for different types of care, but these problems do not have determinate solutions.

The following chapter steps back from the highly detailed analysis of this chapter and concentrates on the development of fairly abstract

economic models of the demand for medical care. In the work we review, the specific factors cited in this chapter tend to be aggregated into categories such as earned and unearned income, efficiency of household production, prices, "tastes," and "environmental circumstances." Simplification of this sort allows for mathematical manipulation of the models and the derivation of a few testable hypotheses.

Chapter 4. REVIEW OF ECONOMIC MODELS OF THE DEMAND FOR MEDICAL CARE

ECONOMIC MODELS

Simple Utility-Maximizing Models

The initial statistical forays by economists into the field of health research were based on demand equations derived from the maximization of an individual utility function subject to a simple budget constraint. In a two-good world of medical services (m) and all other goods (X), this model would be a variation on the one below:

(1) maximize $U = U(m, X)$

(2) subject to $pm + qX = y$

where $U \equiv$ utility

$p \equiv$ price of a unit of medical services

$q \equiv$ price of a unit of other goods

$y \equiv$ individual income, which is completely exhausted by expenditures on m and X.

Economic analysis in the 1960s did not even make this model explicit. Rather, economists simply used the predictions of the model--well known to all priciples of economics students--that

1. The demand for medical services depends on own price, other prices, income, and tastes.
2. Own price elasticities should be negative, cross price elasticities should be positive for most goods, and if medical care consumption is a normal good, then the income elasticity of demand should be positive.

The major goal of the work was to estimate these elasticities, which were found to be uniformly low.

Estimation of the model was usually done with aggregative data in a single equation framework, with a few demographic variables included to control for "tastes." While little effort was focused on the underlying model itself, much work was done on the sticky econometric problems involved. These included model specification, the algebraic form of the variables, and variable definition.[14]

It is important to bear in mind that this simple utility-maximizing model relied on the assumption (which many contend is unrealistic) that people derive utility directly from the consumption of medical services, just as they would from a new pair of shoes or a meal in a restaurant. Moreover, the total price of the service was taken to be simply the out-of-pocket cash cost; no time costs were considered.

Time Costs

Jan Paul Acton (1973, 1975a, 1975b) used the same utility-maximizing model described above but incorporated into the budget constraint the Gary Becker (1965) argument that there are time costs associated with consumption activities. The Acton model took the following form:

(1) maximize $U = U(m, X)$

(3) subject to $(p + wt)m + (q + ws)X \leqq Y = y + wT$

where $p \equiv$ money price per unit of medical services

$t \equiv$ time price per unit of medical services

$q \equiv$ money price per unit of other goods

$s \equiv$ time price per unit of other goods

$w \equiv$ hourly earnings

$Y \equiv$ full income including earned, nonearned, and the opportunity cost of home production

$y \equiv$ nonearned income[15]

$T \equiv$ total time available for market and own production

The two goods m and X have associated with them not only their money prices, but also the amount of time (t and s respectively) used in consuming them. Time is valued at the wage rate. Moreover, the concept of full income, namely earned and nonearned income, is used in this model.

Acton's focus is on the role of time costs as a rationing device when insurance or public expenditure programs drive the out-of-pocket costs of medical care to zero. Consequently, his interest is in deriving comparative statics results for the two types of costs. This effort leads to the mathematical representation (shown below) of the fact that the elasticity of demand with respect to either time cost or money cost is simply a percentage of the elasticity of demand with respect to total price:

(4) $N_{mp} = \frac{p}{\pi} N_{m\pi}$

(5) $N_{mt} = \frac{wt}{\pi} N_{m\pi}$

where $\pi \equiv (p + wt)$, the full price of m

$N_{mp} \equiv$ elasticity of demand with respect to (w.r.t.) money price

$N_{mt} \equiv$ elasticity of demand w.r.t. time price

$N_{m\pi} \equiv$ elasticity of demand w.r.t. total price

It is easily seen from (4) and (5) that as $wt \gtreqless p$, $N_{mt} \gtreqless N_{mp}$. Consequently, a prediction unique to this model is that demand becomes relatively more sensitive to time costs as coinsurance or welfare programs push p (the cash price of medical services) toward zero (and wt--the time price--does not go to zero). In other words, the demand for free medical services will be more sensitive to time prices than will be the demand for paying services.

A second prediction of the model concerns the differential impact of earned and nonearned income on demand. If consumers treat medical service as a normal good, then increases in nonearned income have an unambiguously positive effect on use. For the same service, however, increases in earned income may have exactly the opposite effect because increases in wages raise not only income but also the opportunity cost of time. Thus an increase in the wage raises the total price of the good and causes a substitution effect away from it (unless, of course, all goods require the same amount of time inputs).

In other words, since goods are thought of as having two prices (cash and time), either of the two can act to deflect demand towards other goods or towards other producers of the same good. An increase in wages increases an indiviudal's capacity to pay the cash costs, but it simultaneously raises the person's value of time, or time cost, connected with consumption activities. Goods or services which require relatively larger commitments of time in order to be consumed henceforth become relatively more expensive to the individual.

The attraction of Acton's model is its clever blend of the simple utility maximization model with variables thought to be important for policy, namely time price and unearned income. Moreover, as Acton himself claims, the model yields predictions similar to those of far more complex treatments. Nevertheless, there is no explicit role in the model for "health need," thought to be the single most important determinent of medical service demand, or for relevant demographic variables. In Acton's empirical work he was forced simply to add these variables as controls.

From a theoretical standpoint, time-price probably has no place in a pure consumption model of the Acton type. For Becker, (1965), time logically entered the budget constraint because the household was viewed as a production unit which combined its own time with market-purchased goods to produce pleasure-giving commodities. In Acton's model, where the individual derives pleasure directly from the consumption of medical services, consumption is a leisure activity. Thus consumption activities are assumed to be undertaken when time has zero cost; so the insertion of time costs into the budget constraint is the consequence of pragmatic concerns and not of logic.

Household Production Model

A. G. Holtman (1972) attempts a straightforward application of Becker's (1965) time allocation model with none of Acton's simplifications, to the demand for medical services. There were some problems with the model presented in the 1972 paper, but Holtman and Olsen (1976) corrected them in a paper which applied the model to the market for dental services. In the Holtman type of model, an individual is assumed to maximize utility over two commodities produced in the home using inputs of market goods and the individual's time:

(6) maximize $U = U(D,C)$

(7) subject to $(p_d b_d + t_d w)D + (p_c b_c + t_c w)C = Tw + B = Y$

(8) given production relationships $T_d = t_d D$

$T_c = t_c C$

$X_d = b_d D$

$S_c = b_c C$

$U \equiv$ utility

$D \equiv$ the commodity "dental hygiene"

$C \equiv$ composite of other commodities

$p_d \equiv$ fixed price of dental services

$b_d \equiv$ the fixed coefficient of production relating the market-purchased input, dental services, to the output of home production, dental hygiene

$t_d \equiv$ the coefficient relating the input of time to the production of dental hygiene

$w \equiv$ fixed wage

$b_c \equiv$ the coefficient relating the production of other commodities to the input of a market good

$p_c \equiv$ fixed price of that market good

$t_c \equiv$ time coefficient of production of other commodities

$T \equiv$ total time available

$B \equiv$ other income

$Y \equiv$ "full" income

The point of departure for this model is the assumption that individuals derive utility not directly from goods purchased in the market but from "commodities" produced in the home using doses of the individual's time and purchases of market goods. In equation (6) the dental patient maximizes the utility he derives from the home-produced commodity called "dental hygiene"

and a composite of other commodities. Dental hygiene is produced by combining dental services purchased in the market with the individual's own time in the fixed-coefficient (input-output) production framework equation (8) gives. Equation (7) indicates that the cost of the commodities is not given directly by the market but is a shadow price dependent on the cost of the inputs used and the efficiency of the individual's home production function.

The value of this type of model does not lie in the uniqueness of the comparative statics results, for they are identical to Acton's. Rather, the appeal of the approach is that it replaces the simple notion that individuals derive utility directly from the consumption of dental (medical) services with the more realistic assumption that the source of utility is what is produced by these services, namely dental hygiene (health).

However, the introduction of household production relationships into the consumption problem provides for the possibility of rigorously modeling the sources of differences in household efficiency, or the economic effects of demographic variables. Holtman fails to do this but does show that changes in household efficiency have income and substitution effects weighted by the individual's wage rate. A deficiency of the economic approach to utilization remains however, in that there is no place in the model for health need or health [illegible].

<u>Human Capital Model</u>

Selma [illegible] (1962) wrote a very early essay using the newly developed theory of human capital to compare health and education as capital goods. Michael Grossman (1972a, 1972b) combines Mushkin's approach and household production theory to formulate a model treating the demand for medical services both as an investment and as a consumption phenomenon.

In this model the consumer is assumed to maximize utility over a bundle of Becker-style commodities, just as in the Holtman model. However, the individual is conceptualized as owning a stock of health capital with utility being derived over a lifetime from the flow of services attributable to that stock of health, or, put differently, from enjoying healthy days. Below is a somewhat simplified and truncated version of the Grossman approach.

(9) maximize $U = U(\phi_o H_o, \ldots, \phi_n H_n, Z_o, \ldots, Z_n)$

(10) subject to $\Sigma \dfrac{P_i M_i + F_i X_i + W_i(TH_i + T_i + TL_i)}{(1 + r)^i} = \Sigma \dfrac{W_i \Omega}{(1 + r)^i} + A_o = R$

(11) given household production relationships:

(a) $H_{i+1} - H = I_i - \delta_i H_i$

(b) $I_i = I_i(M_i, TH_i; E_i)$

(c) $Z_i = Z_i(X_i, T_i; E_i)$

where: H_o ≡ initial stock of health capital

H_i ≡ stock of health in the ith time period

ϕ_i ≡ service flow per unit stock in the ith time period (healthy days)

Z_i ≡ total consumption of another commodity in the ith time period

P_i ≡ price of medical care

M_i ≡ medical care

F_i ≡ price of market goods used in producing Z_i

X_i ≡ market goods used in producing Z_i

W_i ≡ wage rate

TH_i ≡ time used in producing health

T_i ≡ time used in producing other commodities

TL_i ≡ time lost due to illness or injury

r ≡ interest rate

$\Omega \equiv TW_i + TH_i + T_i + TL_i \equiv$ total amount of time available

$TW_i \equiv$ hours of work

$A_o \equiv$ discounted property income

$I_i \equiv$ gross investment

$\delta_i \equiv$ rate of depreciation of stock of health

$E_i \equiv$ stock of human capital

At first glance this appears to be a formidable complication of the household production model, but it is basically rather simple. The area of choice for the individual is whether to produce additional investments in health using his own time, human capital, and market-purchased medical care (equation 11b) or to produce other pleasure-giving commodities according to equation (11c). The budget constraint simply states that the discounted costs of lifetime consumption expenditures (in both money-prices and time-prices) must equal the individual's discounted lifetime income.

Choice is also affected by the fact that the individual's state of health is constantly deteriorating, or in Grossman's terms, his stock of health capital is depreciating. Equation (11a) states that the stock of health is expanded from period to period only if annual investments exceed annual depreciation. Since the rate of depreciation (δ) is expected to increase over a person's life span, there is an inevitable depletion of the stock of health until it falls low enough that death ensues.

Accordingly, in the economist's world of complete certainty and perfect knowledge, individuals assess the attractiveness of health expenditures versus other goods in full awareness of the state of their health, its rate of deterioration, and the technical relationship between health care expenditures and the production of health capital. A novelty of this approach is that people can choose their life spans by deciding when they will let their stocks of

health fall to zero.

Grossman derives a fundamental relationship from his model, namely that the marginal cost of investments in health must equal the marginal rate of return to those investments:

$$(12)\quad \overbrace{\gamma_i + a_i}^{MR} = \overbrace{r - \tilde{\pi}_{i-1} + \delta_i}^{MC}$$

where MR ≡ marginal rate of return of investments in health

MC ≡ marginal cost

γ_i ≡ marginal money rate of return to an investment in health (pecuniary return)

a_i ≡ marginal psychic return (consumption return)

r ≡ interest rate forgone by not investing in other assets

$\tilde{\pi}_{i+1}$ ≡ % change in marginal cost from the last period to the current period

δ_i ≡ rate of depreciation of health stock.

If $a_i = 0$, then no utility is derived from medical care and it can be treated solely as an investment good. This enables Grossman to treat the consumption and investment aspects of medical care separately.

In the investment model ($a_i = 0$), the optimal stock of health capital is given by:

$$(13)\quad \frac{W_i G_i}{\pi_{i-1}} = \gamma_i = r - \tilde{\pi}_{i-1} + \delta_i$$

where W_i ≡ daily wage rate

G_i ≡ the marginal physical product of health, or the number of healthy days generated by a unit of health capital

π_{i-1} ≡ the marginal cost of the gross investment in health in the last period including both time and money costs.

Grossman traces the effects of age, income, and education on both the demand for health capital and the derived demand for medical care. If it is

assumed that age affects only the rate of depreciation of the stock of health capital[16] (δ_i), then for given W_i and π_{i-1} in equation (13), age (which raises δ_i) will give an individual the incentive to choose a lower stock of health capital each year in order to raise G_i, the marginal physical product of health, and remain in equilibrium (to keep the marginal cost of health investments equal to their marginal rate of return).

A lower stock of health is entirely compatible with higher purchases of medical care, however, since from equation (11a) a high rate of depreciation requires a high rate of investment just to maintain the current stock of health. The actual effect of age on medical care purchases therefore depends on the elasticity of the marginal efficiency of capital schedule.[17]

As the wage rate rises (ceteris paribus) the value of the marginal product of health increases because WG in equation (13) increases. In addition, the cost to the individual of days missed from work increases. The production of health capital at home requires the input of an individual's own time; so the cost of producing health in the home increases relative to the use of market-produced medical services. Hence, an increase in the wage rate sets up an incentive for the individual to substitute purchases of medical care for his own time, causing an unambiguous increase in the demand for medical services along with the increased demand for health capital.

Changes in education have the effect of shifting the entire marginal efficiency of capital schedule. If it is assumed that wages are not affected by education (which is not true, but is done to isolate education's partial effects) and that education does not differentially affect consumption and home production, then an increase in education will necessarily raise the demand for health capital. It may reduce actual purchases of medical care,

however, if the increased efficiency of home production is used to substitute for market purchases. This condition--increased demand for health but reduced demand for medical care--holds if the marginal efficiency of capital schedule is inelastic.

Grossman develops his pure consumption model by letting $\dot{\gamma}_i$ in equation (12) equal zero. Then all of the marginal return to healthy days would be due to psychic benefits (conversely, individuals derive disutility from sick days). Investments in health capital would depend not on any pecuniary return but simply on the taste for present versus future health.

In the pure consumption model, age continues to reduce the stock of health. There is no depreciation per se, but discounted healthy days in the future are always more expensive than healthy days in the present and therefore are not purchased in quantities adequate to increase the stock of health constantly. Nevertheless, a person facing a positive rate of interest but with a strong preference for healthy days in the future might actually increase his stock of health for a while. Medical purchases will tend to rise with age, but this depends on the elasticity of the marginal rate of substitution schedule between present and future health.

Wage increases in the consumption model have the same ambiguous effect as in Acton's and Holtman's models. Higher wages raise demand for all normal goods and services, but they also raise time costs in home production. If time costs are more important in the production of health than they are in the production of other commodities, then health becomes relatively more expensive, and there is substitution away from it. Consequently, demand for health may fall, and the demand for medical services may fall as well.

Similarly, education has ambiguous effects. More education raises home and market productivity, reducing the shadow price of all commodities. If

it does not equally improve the productivity of all commodities, then a substitution effect may be caused, making the total effect of education on purchases of medical services unpredictable.

Grossman's model is ten years old but still stands as the most complete and rigorous work in the field. While Grossman did not completely overcome the shortcomings of the other models, he did incorporate health need (through the stock of health and the depreciation rate) into the calculus. The pure investment model provides expected signs on at least two demographic variables, age and education.

The effect of illness, or need, is not perfectly modeled. The depreciation rate is a fairly continuous datum when it is proxied by age, and this contradicts the common sense notion that the deterioration of health status probably fluctuates quite wildly through a lifetime (although along a long-run, negatively sloped curve when health status is plotted against age).

Jack Dowie (1975) suggests that the Grossman model suffers most from the classical assumption of complete certainty. People generally do not know how inputs (e.g., diet, smoking, driving) affect their stock of health, and Dowie claims that this uncertainty would make it perfectly rational for even a risk averse individual to pursue bad habits.

Coinsurance

In a series of papers, Charles Phelps and Joseph Newhouse (see Newhouse and Phelps, 1974; Phelps and Newhouse 1973, 1974) superimpose a model of the demand for health insurance developed by Phelps (1973) on the household production model. In Acton's model the effects of coinsurance can be determined by calculating a price net of insurance. A similar adaptation can be made for Grossman's model although in practice, dummy variables for

for insurance coverage are used. The difference between these and the Phelps-Newhouse framework is that coinsurance can be made somewhat endogenous in the latter approach. That is, one's state of health, which is random, induces the individual to purchase insurance and to choose a specific coinsurance rate, which is then taken as given when medical care is actually purchased. The Phelps-Newhouse model is constructed along these lines:

(14) maximize $U = U(X,H)$

(15) subject to $p_x x + Cp_h h + R = I = wT$

(16) given

(a) $H = H_o - \ell + g(h)$

(b) $T = T_o - th$

(c) $R = \int (1+\emptyset)(1-C)p_h h(\ell) f(\ell) d\ell$

where

$U \equiv$ utility

$x \equiv$ other goods

$H \equiv$ level of health

$p_x \equiv$ price of other goods

$C \equiv$ coinsurance rate (% of fees paid by the insured patient)

$P_h \equiv$ price of medical care

$h \equiv$ medical care

$R \equiv$ cost of insurance contract

$I \equiv$ income

$T \equiv$ total productive time available

w wage rate

$H_o \equiv$ initial stock of health

$\ell \equiv$ illness

$g(h) \equiv$ home production of health using medical care

$t \equiv$ time spent using medical care

$\emptyset \equiv$ loading fee or charge above expected insurance benefits

$(1-C) \equiv$ % of fees paid by insurer

$h(\ell) \equiv$ loss-specific amount of medical care purchased.

$f(\ell) \equiv$ known distribution of losses

This is a simplification of the home production model. Only health care has a time cost because all other commodities are purchased directly in the market. The budget constraint (15) is similar to those already encountered but also includes the cost of the insurance policy and the coinsurance rate, determined in (16c). A variation on Grossman's model occurs in (16a), where the level of health is reduced by illness (ℓ) and increased by the production of health ($g(h)$).[18]

Equation (15) allows a specific elasticity of demand with respect to the coinsurance rate to be derived. Furthermore, the elasticity of demand with respect to the wage rate and time costs is now partially dependent on the coinsurance rate:

$$(17) \qquad N_{hp_h} \simeq N_{hc} \frac{C_{pn}}{C_{p_h} + W^t} (\varepsilon)$$

$$(18) \qquad N_{hw} \simeq N_{ht} \frac{WT}{C_{p_h} + wt} (\varepsilon)$$

Where:

N_{hp_h} ≡ elasticity of demand w.r.t. the price of medical services

N_{hc} ≡ elasticity of demand w.r.t. the coinsurance rate

N_{hw} ≡ elasticity of demand w.r.t. the wage rate

N_{ht} ≡ elasticity of demand w.r.t. time price

ε ≡ elasticity of demand w.r.t. total price of medical services ($Cp_h + wt$)

The predictions thus derived are quite similar to those of Acton's model. Although all types of medical services are homogeneous, they can generate different price elasticities depending on the relative mix of time costs and insurance coverage that is characteristic of the service:

1. If the coinsurance rate is low and the time-price is high (free public services) then the time-price elasticity will be high.
2. If the coinsurance rate is high and the time-price is unimportant (home visits) then the money-price elasticity will be high.

Also the severity of illness, which enters (16a) and (16c) as $\underline{\ell}$, can affect the elasticities, a notion not previously modeled (i.e., the more serious the illness, the less sensitive one is to medical costs.)

Phelps and Newhouse (1974) claim a generalization of Grossman's model by dropping the assumption that medical services are homogeneous and adding the insurance variables. This allows them to derive general expressions for own-price and cross-price elasticities of demand. In the statistical section they also introduce "style" effects by assuming that different services have different marginal productivities (i.e., general practitioner vs. specialist) but that price differences among similar sources reflect only differences in amenities.

The Phelps-Newhouse models are valuable as a realistic exposition of the demand for inpatient care in high income countries, but the added complexity purchases little that is not possible with Acton's model. Illness, which is intuitively an important determinant of the demand for medical care, is made an explicit part of the model.

Household Demand

The previously cited articles use the individual as the primary unit of

analysis. Laurence Miners (1979) takes exception to this approach, arguing that the family should be viewed as the fundamental unit of analysis because of interactive effects and constraints within the household. The interdependence of the health status of family members should be caused by the communicability of diseases, genetic characteristics, and the healthfulness of the household environment, according to Miners. Constraints imposed by the family's budget, insurance coverage, and household time allocation patterns (such as the availability of a parent to take a child to the doctor) limit the ability of individuals to consume medical care. To overcome these problems, Miners proposes an Acton-type utility function and budget constraint wherein the family maximizes utility.

(19) Maximize $U = U(M_j, N_j, D, Z) \qquad (j=1,\ldots,n)$

(20) Subject to $\sum_{j=1}^{n} (P_j + L_j t_j^M)M_j + \sum_{j=1}^{n} (Q_j + L_j T_j^N)N_j + (P_D + \sum_{j=1}^{n} L_j t_j^D)D =$

$$(P_Z + \sum_{j=1}^{n} L_j t_j^Z)Z = \sum_{j=1}^{n} L_j (T_j - T_j^S) + Y$$

Where:

$U \equiv$ utility

$M_j \equiv$ medical goods and services consumed by the jth individual family member

$N_j \equiv$ j^{th} member's consumption of household-produced medical care

$D \equiv$ composite good representing the sanitary conditions within the home.

$Z \equiv$ composite of all other goods and services consumed by the household

$P_j, Q_j \equiv$ money prices of medical care visits and household medicines used by the jth individual

L_j ≡ j^{th} individual's wage rate

t_j^M, t_j^N ≡ j^{th} individual's time input into the consumption of medical care and production of home remedies.

P_D, P_Z ≡ money price of D and Z respectively

t_j^D, t_j^Z ≡ time inputs of jth individual into the consumption of D and Z respectively.

$T_j - T_j^S$ ≡ total productive time of jth individual (less sick time)

Y ≡ unearned household income

This approach should be quite familiar by now. Miners expands the utility function to include not only purchased medical care and other goods but home-produced care for each family member and the condition of the dwelling unit. In the budget constraint the consumption of each of these goods is assigned a time price and a money price; total expenditures exhaust full family income.

Miners solves the mathematics of the model for a simple husband-wife family. Since the model is directly comparable to Acton's, it should not be surprising that Miners' comparative statics results are identical to Acton's except for the considerable complication introduced by using two people, and the addition of cross-price elasticities of demand between family members. That is, visits by one or another family member could conceivably substitute for or complement visits by another. The direction of those effects cannot be signed a priori, however.

A problem Miners addresses in his dissertation but fails to overcome is the theoretical problem of deriving well-behaved indifference curves for a group of people (see Miners, 1979, pp. 15-29). This difficulty is

minimized if it can be assumed that the family as a unit, or to put it more strongly, the head of the household, makes consumption decisions which maximize family utility. For obvious reasons, such a scenario is most appropriate to the decision to seek medical care for children since someone in authority dictates those decisions.

Demand for Children's Health Care

Two other family (or household) oriented models focus on the demand for pediatric care.

In the Leibowitz and Friedman (1979) model, parents maximize utility over their own consumption, health investments in their children, and financial bequests to their children (for a two-period time horizon):

(21) Maximize $U = U(C_1, C_2, E)$

(22) Subject to $x_2P + B = (V+Y_1 - Px_1 - x_3)(1+r)+Y_2$

(23) Given (a) $C_i = f_i(t_i, x_i)$ $i=(1,2)$

(b) $H = h(x_3, t_3; g, p)$

Where $U \equiv$ utility

$C_i \equiv$ parental consumption activities in time period i.

$E \equiv$ endowment passed on to children

$B \equiv$ money endowment to children

$P \equiv$ constant price of x_2 relative to x_3

$V \equiv$ financial assets of family at the beginning of the first period.

$Y_1 \equiv$ full family income in first period

$Px_1 \equiv$ expenditures on purchased goods in first period.

$x_3 \equiv$ goods used to produce human capital in children (at home)

$r \equiv$ interest rate

$Y_2 \equiv$ second period "full income"

$t_i \equiv$ parental time used in consumption activities in time period i. (i=1,2)

$x_i \equiv$ purchased goods in period i (i=1,2)

$H \equiv$ human capital of children

$t_3 \equiv$ time used in the home production of children's human capital stock of the children

$g \equiv$ genetic stock of the children

$p \equiv$ parental attributes affecting their productivity

In this model there are two parents, but the js used in the Miners model are suppressed; so the parents are treated as acting in unison. Parental utility is maximized over two time periods. In the first period the children live in the home and receive human capital investments from the parents. In the second period the children are grown and the parents derive pleasure from the endowments previously presented to the children. (The parents also engage directly in consumption activities, of course, using time and market goods according to (23a).)

The endowment is formally presented to the children at the beginning of period two; it is composed of human capital and a money transfer. The human capital is produced by the parents according to equation (23b) using goods and time, but it also consists of a genetic endowment and depends on the productivity of parental inputs. The budget constraint (22) says that expenditures on consumption in period two plus the monetary bequest to the children in period two completely exhausts savings from period one (including the stock of previously held assets) plus income in period two.

Leibowitz and Friedman use an additive utility function separable between

parental consumption and bequests to illustrate that in equilibrium the marginal utility of additional investments in children must equal the marginal cost of those investments weighted by the marginal utility of income. If it is assumed that the marginal utility of income declines with increases in family income, then the demand for medical care can be shown to be positively related to permanent family income up to the point that the diminishing marginal returns to investments in human capital cause parents to make additional bequests in the form of money. This is the major prediction of the model; namely, that there is some household-determined level of income beyond which additional income will not result in more medical care for the children.

As in Grossman's model, education increases the productivity of home and market activities. Leibowitz and Friedman claim that high levels of parental education would therefore result in greater investments by parents in their children (presumably, because of the income effect of the increased productivity) and more physician visits, although neither of these predictions is derived mathematically from the model. Moreover, it is claimed that if working mothers face a higher opportunity cost of their time (i.e., their wages increase), then they would make fewer physician visits. This prediction is, like the others, not unambiguously forthcoming from the model, since for it to be true physician visits would have to be relatively more expensive than other consumption activities in terms of the time inputs required. The authors also claim that the more children in a family, ceteris paribus, the lower the planned endowment per child would be, because resources would have to be distributed over more children. Consequently, fewer health inputs would be demanded per child (although this would still be consistent with greater household demand for larger households). This is thought to be a theoretical rationalization for including family size as a determinant of

medical service demand and for giving it an expected sign (negative). While this conceptualization might have been appropriate for individual demand, however, it could not be unequivocally true for household demand.

The Leibowitz and Freidman approach suggests an interesting way to think about household decision processes as they affect the rearing of children. Mathematical manipulation of the model is very untidy, however, and despite the authors' claim to derive some new hypotheses from it, the foregoing discussion casts considerable doubt on the claim.

Goldman and Grossman (1978) use the hedonic approach to derive separate demand curves for the quality and quantity of pediatric care visits. They use the following framework:

(24) maximize $U = U(v,g,z)$

(25) subject to $S = z + \hat{p}vq + v(wt_1 + wt_2 + c)$

(26) given (a) $h = h(v,q,y)$

(b) $f = c + w(t_1 + t_2)$

(c) $\Psi = \Psi(h,z)$

where $U \equiv$ derived utility

$\Psi \equiv$ utility

$v \equiv$ physician visits

$q \equiv$ quality per visit

$z \equiv$ other commodities (interpreted as the family's standard of living)

$S \equiv$ "full income"

$\hat{p} \equiv$ average price of physician visit

$p \equiv$ quality-adjusted price, or p/q

$w \equiv$ mother's opportunity cost (wage rate)

$t_1 \equiv$ travel time to physician's office

$t_2 \equiv$ waiting time at physician's office

$c \equiv$ transportation costs

$h \equiv$ child health

$y \equiv$ other variables

$f \equiv$ fixed cost of a visit

This model begins with equation (26c) in which parents maximize utility over child health and other commodities. Child health is produced according to (26a) using primarily the quality and quantity of physician visits. Substituting (26a) into (26c) yields (24), a derived utility function equation. (26b) indicates that the fixed cost of a visit is the transportation cost and the value of the mother's time in taking the child to the physician. This partially determines the budget constraint, in which full family income is exhausted on the purchase of consumer goods and the total cost of medical care for the children.

The comparative statics results for the reduced form yield the following predictions:

1. Visits are more responsive to income than to quality (the ratio of quality to visits falls)
2. Visits fall and quality rises as the fixed cost of a visit goes up
3. Quality-adjusted price increases reduce quality faster than visits (the ratio of quality to visits falls).

The Goldman-Grossman model illustrates a simple framework for measuring the demand for pediatric health care and makes an attempt to model the elusive but crucial problem of the quality of medical care visits. It also disaggregates the time variable into waiting time and transportation time and includes transportation cost as a cost of seeking care.

Demand in Low Income Countries

Miners (1979) argues that the household production model is not necessary to derive demand equations and may actually lead to illogical results. The line of reasoning is derived from Arthur De Vany (1970); he argues that old-fashioned goods and not Becker-style commodities are the relevant units of analysis. Generally speaking, time spent on a trip to a health care center more than likely also involves other activities, such as buying groceries, reading, knitting, and talking. Thus time cost should realistically enter the budget constraint in a complex manner and not in the simple form favored in the models reviewed so far. Moreover, specifying household production functions may be beyond the capability of production theory (Lomperis, 1979; Pollak and Wachter, 1975).

Illogical results can be traced to the idea that household production is a substitute for the use of market goods. A primary assumption of production theory is that the marginal productivity of all inputs is positive, but this is violated if, for instance, householders' time cannot substitute for the input of professional medical services. According to Miners ". . . if the number of physicians (or time input of the physician) and use of the examining room are held fixed, the consumer is hardly in a position to increase output" (1979, p. 27).

Thus Miners avoids household production theory and maximizes the following utility function:

(27) $$U = U(M,N,D,Z).$$

In the household production framework this would be:

(28) $$U = U(H,Z)$$

(29) given $$H = f(M,N;D,E)$$

where $E \equiv$ environmental factors, particularly the household's stock of human capital

The De Vany-Miners approach retains time-price in the budget constraint as a nonpecuniary cost of consumption activities. This provides a theoretical basis for viewing a simple Acton-type model as an alternative to the complex Grossman, Holtman, and Leibowitz models and not as an inferior approach to the same problem.

This discussion is particularly relevant to the modeling of health care demand in low income countries. Conditions in those countries are such that a large number of factors that can be taken as invariable across households in high income countries require the analyst's attention. The condition of the dwelling unit, the quality of the drinking water, the healthfulness of waste disposal methods, the condition of roads, the availability of transportation, the effects of weather change, the family structure, the variability of beliefs and education, the presence or lack of communications equipment, and so on, may have significant bearing on health status and medical care use from village to village and household to household. On the one hand, these variables could be modeled as "parameters of household efficiency" in the household production framework, but identical results could be derived from a much simpler model of the sort used by Acton or Miners.

Peter Heller (1976, 1982) took the latter approach to develop a model in which he attempts to incorporate some of the relevant demographic variables while avoiding the human capital and household production theories. He defines health needs as an inverse function of health status, determined by both economic and environmental factors. Utility is then maximized over the

consumption of goods and discretionary purchases of medical care (purchases of care beyond the minimum, necessary level).

(30) $H = H(x,k,A,E,e)$ [Health Status]

(31) $m = G(H) = g(x,k;A,E,e)$ [Health Need]

(32) maximize $U = U(k,x,m')$

(33) subject to $(\Pi_1 + wt)k + (\Pi_2 + ws)(m+m') + (\Pi_3 + wu)x \leq Y = y + wT$

where $H \equiv$ health status
$x \equiv$ composite of other goods and services
$k \equiv$ preventive services
$A \equiv$ individual age
$E \equiv$ hygienic quality of home environment
$e \equiv$ virulence of disease agents in community
$m \equiv$ necessary level of curative consumption
$m' \equiv$ discretionary purchases of medical care
[$m+m' = M$ (total purchases of medical care)]
$\Pi_1, \Pi_2, \Pi_3 \equiv$ respective money prices of k, M, and x
$t, s, v \equiv$ respective time-prices of k,M, and x
$w \equiv$ wage rate
$y \equiv$ unearned income
$wT \equiv$ earned income (T = productive time available)
$Y \equiv$ full income

Clearly this is a variation of the Acton model, and the basic comparative statics results are similar.[19] Own money-price and time-price effects are negative, as expected, for k, x, and m'. However, price (time and/or money) increases may not lead to a reduction in the demand for m (necessary care); consequently own-price increases may not cause a reduction in M (total medical care purchases), although this is likely. Increases in the cost of medical care may lead to greater consumption of substitutes, but if necessary care is a large component of M, then the price increase is felt

mainly as an income effect which results in the reduced consumption of other goods as resources are diverted to the purchase of needed medical care. This in turn may actually lead to lower health status and greater need in the future. This prediction is unique to Heller's model; it results from his breakdown of M into its necessary and discretionary components.

Increases in unearned income unambiguously increase the consumption of discretionary medical care if m' is a normal good. However, higher income will lead to improved health status if x and k are normal goods, reducing medical need and the consumption of necessary care (m). Thus the total demand for medical care (M) will react to income changes according to the relative importance of m' and m. As in Acton's model, increases in earned income have ambiguous effects because of their effects on the time costs of consumption.

Heller and Drake (1979) define the health status of children according to:

(34) $$H = g(N, M, H_{t-1}, \Delta N, E, L)$$

where $E \equiv$ medical risks inherent in the external environment

$N \equiv$ nutritional intake

$M \equiv$ extent to which parents are able to insulate children from E by providing nonfood inputs (clothing, shelter, attention)

$L \equiv$ quality of parental care

$H_{t-1} \equiv$ own physical ability of the child.

In modeling the demand for medical services in low income countries, attention should be paid to the determination of health status and medical need as Heller has done. As mentioned before, the determinants of health status are not nearly so constant across households as they are in high income countries. Even if a health status (or need) function does not enter the theoretical model, the issue must be addressed in constructing the

statistical model if it is to have any validity.

Conclusion

We have examined the development of demand models for medical care. These models have progressed from simple utility-maximizing ones to elaborate formulations which have addressed other issues such as time costs, human capital formation, health status, insurance coverage, family bequests, and the difference between needed medical care and discretionary medical purchases. The most important conclusions of the analysis are these:

1. Education should be treated as an efficiency parameter but in most cases will not have a predetermined effect on medical purchases. Higher levels of education have a positive income effect (because of the increase in efficiency), which should lead to more purchases of medical services if they are a normal good. More education also increases the opportunity cost of time, however. This wage effect may cause the substitution of medical purchases for household-produced health care since the latter becomes relatively more expensive as wages rise. On the other hand, an increase in wages may cause substitution away from medical purchases altogether if they are relatively more time intensive than other goods. Futhermore, the efficiency (or income) effect may lead to improved health status, causing demand to fall for medical inputs of all kinds, Accordingly, even though there is an intuitive notion that higher levels of education should increase consumption of medical goods, this does not flow unambiguously from the models we review.
2. Increases in income from sources other than wages should unambiguously increase the demand for medical services if they are a normal good.

3. Increases in wages have the same two effects discussed for education. Increases in hourly pay increase total income but also increase the opportunity cost of time. Whether the result is a higher level of demand for medical care depends on the relative importance of time costs in the production and consumption of medical goods.
4. Increases in the cash price of medical services should reduce the amount demanded.
5. Grossman has shown that age, for a number of different reasons, should be positively correlated with the demand for medical services. The strength of this relationship will depend on how highly individuals value their health and the marginal return they get from additional purchases.[20]

APPROACHES OF OTHER DISCIPLINES

Medical anthropologists have been studying the health systems of low income countries much longer than members of any other discipline. In the last 20 to 30 years, sociologists and geographers have also made contributions. Economists have only recently become interested in the area.

Since the second and third chapters of this work have been based on the utilization literature accumulated by these other disciplines, we have already reviewed a large sampling of their work. Consequently, we make only a few comments here to describe the differences in focus among the disciplines and the implicit or explicit models underlying the data collected.

Anthropologists have generally taken an extremely broad view of the medical systems of low income countries, treating them as manifestations of social behavior that cannot be understood when taken out of their cultural

context. Maintaining the cultural context usually has meant living among the people being studied and making open-ended, personalized observations about their behavior (instead of using the compartmentalized type of information supplied by sample surveys). This approach has provided an excellent descriptive knowledge of the patterns of use of medical resources and has led to an understanding of the cultural basis of these patterns. As should be obvious from the previous chapters, the anthropological literature emphasizes the role of beliefs, disease etiology, language, social distance between providers and patients, and the psychological costs of modern medicine in explaining patterns of use. This approach has led to the development of formal and informal decision-making models for the choice of treatment strategies.

Cosminsky (1972) developed a nonformal decision-making model which, in addition to analyzing the characteristics of the illness (especially perceived severity) weights the costs and benefits of the alternative treatment resources. The costs include accessibility and proximity to medical resources, time constraints, financial costs, communication barriers, social distance, social sanctions, and psychological costs. The benefits include alleviation or resolution of the illness; immediate versus delayed improvements; return to daily activities; relief from anxiety or quilt; and restoration of disturbed relations with the family, neighbors, or the supernatural. The choice of model was based on informants' statements regarding medical care.

Young (1981) developed a more formal decision-making model. He considers four criteria based on the results of pretests: the gravity or seriousness of the particular illness, whether an appropriate home remedy is known, the faith one has in the effectiveness of the treatment in alleviating the illness, and

the expense and availability of the treatment resources. The available treatment alternatives are self-treatment, folk curers, practicantes,[21] and government or private physicians.

The value of this ethnographic model, according to Young, lies in its attempts to model the process by which people simplify the cognitive operations required to make complex decisions. Young claims that the models which come closest to representing real-world decision processes should also generate the most accurate predictions of behavior, as opposed to economic models in which complex decisions are assumed to be made, always in a rational manner. While decision models have been employed in other domains of anthropological study, such as agriculture, fishing, and adoption, they are only beginning to be used in the area of health behavior.

To a certain extent, anthropologists have shifted their focus in recent years to emphasize exogenous or external factors related to the organization and structure of the health care services, such as bureaucratic complexities, costs, accessibility, and attitudes of the health personnel. Foster (1980) suggests that the focus on cultural barriers in most of the anthropological literature is applicable to the early stages of the introduction of Western medicine, whereas accessibility constraints have become more important as familiarity with Western medicine has increased. Young, however, feels that this shift is because of anthropologists' increasing awareness of the role of exogenous factors as determinants of health care decisions, not to any great changes in behavior. This latter approach, as well as the sociocultural approach, implies that improvement in services depends on change in the providers rather than the patients.

Sociologists have focused in their work mainly on the health care delivery systems of Western Europe and North America. In studying the same phenomena

as anthropologists, sociologists have concentrated on barriers to utilization that are based on social and status differences between provider and patient; thus they have understood health-seeking behavior to be a class-related phenomenon rather than determined by disease or belief. Sociologists have also been interested in familial reactions to disease and existing community social networks for taking care of the sick. The prescriptions which have come from this literature have often involved changes in practitioner behavior and recruitment rather than changes in client behavior (Foster, 1975).

The geography literature has naturally focused on distance as a barrier to use. Since physical proximity has been a major preoccupation of health planners, this literature has had a major impact on the implementation of primary care policies. The types of models used have ranged from the simple to the complex, but generally they have been based almost exclusively on distance (see Annis, 1981; Gesler, 1979; Onokerhoraye, 1976).

The medical literature of these three disciplines is much broader than has been indicated by the foregoing review. Anthropologists especially, but to some extent sociologists too, have devoted a tremendous amount of energy to researching the history of indigenous medicine, the sociology of medical professions, the structure of the medical establishments in different countries, the language and practice of indigenous and modern practitioners, and the transmission of medical technology from high to low income countries. Geographers have studied epidemiological patterns (the distribution, spread, and control of diseases) and have been instrumental in evaluating the effects of control programs (such as immunization campaigns and mosquito-eradication programs). Thus the literature reviewed is not representative of the broad focus of these disciplines and has been radically simplified to focus on the health care use issues we are addressing in this study.

Chapter 5. MODEL OF THE DEMAND FOR HEALTH SERVICES

In this chapter we formulate a simple and very general model of the demand for health services. It is virtually identical to the ones used by Acton (1973, 1975a, 1975b) and Miners (1979). A number of reasons influenced our choice of this model instead of the more complicated household production model that is the current vogue:

1. The Acton model is much simpler than the home production model. In Acton's formulation, health services enter the utility function directly instead of as household-produced commodities. As a consequence, it is possible to derive meaningful comparative statics results, which is virtually impossible in the household production framework. The latter approach yields extraordinarily complex comparative statics equations which, even if they yield to interpretation, usually cannot be given signs without first imposing very strong restrictions on the production functions (see Blau, forthcoming). Moreover, the statistical model dictated by the Acton approach is almost identical to that used to estimate the reduced-form equations of the household production model (see point 3 below for an important exception to this). The difference in the results of the two approaches tends to be semantic--in the Acton

formulation, demand equations are estimated, while in home production theory, similar "derived demand" equations are estimated.

2. Time enters the household production framework in a way that has little practical meaning. Households are assumed to consume nothing directly. Rather, all goods purchased in the market are used simply as inputs in home production of other desired commodities. Given the usual assumptions made when defining utility and production functions (continuous, twice differentiable, etc.), this means that time, as an input in the production process, can substitute continuously for market-purchased goods. Yet there is no continuous substitution of time for market goods that can take place under most conditions.

   In medical care production, to expand on the previously mentioned example from Miners (1979), it seems logical to expect that an individual can produce health in the home by using his time to take market-purchased pills and vitamins, to take a trip to a doctor, to exercise, to prepare and eat good food, and so on. But most people cannot set a leg, diagnose an unknown illness, or perform open heart surgery on themselves. In these cases, their time cannot substitute for market-purchased goods (doctors' skills). The marginal increments to health[22] produced by trying to substitute own time for specialists' time in these complex endeavors would probably be negative, even if the attempt is not lethal. Yet, in production theory, the marginal productivity of all inputs is assumed to be positive.

3. The household production theory treats time as an endogenous variable, which is inappropriate to the present problem, in which time is conceptualized as an exogenous, facility-related cost. To be more specific, in household production theory, the system of derived demand equations

that result from the maximization of the utility function are of this form:

a. Quantity of market goods bought = f(prices, wages; efficiency parameters)

b. Quantity of time used = f(prices, wages; efficiency parameters)

Thus, the household "buys" time in the same manner that other goods are purchased; its price is the wage rate (or opportunity cost). In deciding which medical practitioner to use, however, time should enter the decision process as a cost uniquely associated with each provider.

c. Quantity of visits to each provider = f(prices, time cost, etc.)

This conceptualization of the problem suggests that time should simply enter the budget constraint as another exogenous price. This is the Acton approach.

4. The literature review notes that Grossman was able to model the effects of age and education on medical service demand. These results are not necessarily lost, however, by not using the household production model. The rigorous treatment of age was made possible not by household production theory but by the conceptualization of the problem as one of investment. The use of multiple time periods also played a role. The treatment of education as an efficiency parameter in production yields weak theoretical results (an unsignable income and substitution effect). Moreover, the result is that education should enter the regression equation both as a determinant of the wage rate and as the equivalent of a control variable. This is the very same way it would be used in a well-specified estimation of the Acton model. On the use of the education variable, the Acton model might be slightly more ad hoc; the final result is the same.

The model which follows treats health goods as being weakly separable from all other purchases. This approach structures the decision-making process to view the consumer as making an initial allocation of resources to these two "line items," health as one category and all other goods and services as the other. Thereafter, decisions on how to allocate the health budget are viewed as independent of all other consumption decisions. While this assumption of weak separability does not affect the maximization problem, it does permit the estimation of demand equations for health services without forcing simultaneous consideration of all other types of purchases (Deaton and Muellbauer, 1980).

The following model could be made as complicated as the analyst wants. For instance, the H in the utility function could be disaggregated to reflect the different choices the consumer has, or a set of relevant environmental givens could be included in the utility function. The givens would thereafter appear as constants in many of the equations. The possibility for a larger set of uses for time could be modeled as well. We decided, however, that since none of these changes would materially affect the outcome, the simplest approach was the best.

The comparative statics results are analogous to the usual ones that economists get. Increases in the two prices, time and cash, cause demand to fall if medical care is a normal good. Increases in unearned income cause demand to rise if medical care is a normal good. Increases in the wage rate have an unsignable combination of income and substitution effects; the sign is shown to depend on the relative time intensity of the different consumption options

MAXIMIZATION

We maximize a continuous, strictly quasiconcave, twice differentiable utility function which is weakly separable between health services and a vector of all other goods. It is assumed that the first derivatives of the utility function are positive and that the second derivatives are negative.

Maximize

(1) $U = U(H,Z)$

subject to

(2) $(P_H + wT_H)\ H + (P_Z + wT_Z)Z = y + wT.$

The budget constraint (2) implies that the price per unit of each good is fixed, that the shadow wage is fixed, and that the amount of time required to purchase and consume a unit of H or Z is fixed. The symbols have these definitions:

$U \equiv$ utility,

$H \equiv$ a vector of health services,

$Z \equiv$ a vector of all other goods and services,

$P_H \equiv$ the money price of one unit of health services,

$w \equiv$ the shadow hourly wage, or the opportunity cost of one hour of the individual's time,

$T_H \equiv$ the amount of time used to consume one unit of health services, in hours,

$P_Z \equiv$ the price of one unit of other goods and services,

$T_Z \equiv$ the time required to consume one unit of Z,

$y \equiv$ unearned income (rent, profits, interest, gifts),

$T \equiv$ total time used in market work and in the consumption of goods and services. $T_H + T_Z + T_w = T$

Maximizing utility subject to this budget constraint is equivalent to maximizing the following Lagranean:

(3) $L = U(H,Z) + \lambda\ [y + wT - (P_H + wT_H)H - (P_Z + wT_Z)Z]$

First-Order Conditions for a Maximum

(4) $L_H = U_H - \lambda(P_H + wT_H) = 0$

(5) $L_Z = U_Z - \lambda(P_Z + wT_Z) = 0$

(6) $L_\lambda = y + wT - (P_H + wT_H)H - (P_Z + wT_Z)Z = 0$

From the first-order conditions we derive the usual result that in equilibrium the consumer must allocate his time and money in such a way that the ratio of marginal utility to price is equal for each good:

(7) $$\frac{U_H}{(P_H+wT_H)} = \frac{U_Z}{(P_Z+wT_Z)} = \lambda$$

Second-Order Conditions for a Maximum

The following bordered Hessian is formed from the first-order conditions:

(8) $$|\bar{H}| = \begin{vmatrix} 0 & P_H + wT_H & P_Z + wT_Z \\ P_H + wT_H & U_{HH} & U_{HZ} \\ P_Z + wT_Z & U_{ZH} & U_{ZZ} \end{vmatrix}$$

(9) $$|\bar{H}| = 2U_{HZ}\ (P_H + wT_H)(P_Z + wT_Z) - U_{ZZ}(P_H + wT_H)^2 - U_{HH}(P_Z + wT_Z)^2$$

We want to be certain that the stationary values ($\bar{H}$, $\bar{Z}$, and $\bar{\lambda}$) calculated from the first-order conditions (4,5, and 6) locate a global maximum for the constrained utility function. A sufficient condition for this to occur is that the bordered Hessian (8) be negative definite. This requires that the principal minors alterante in sign, or that (9) be positive. Our assumption that the utility function is strictly quasiconcave, continuous, and twice differentiable and that the marginal utilities are positive but decreasing

are sufficient to assure that these conditions are met.

DEMAND EQUATIONS

Satisfaction of the second-order equations allows us to define demand equations in which the endogenous variables are implicit functions of the exogenous variables:

(10) $\bar{H} = \bar{H}(P_H, P_Z, T_H, T_Z, w, y, T)$

(11) $\bar{Z} = \bar{Z}(P_H, P_Z, T_H, T_Z, w, y, T)$

$\bar{H}$ and $\bar{Z}$ are the quantities of health services and other goods which make up the market basket of goods and services that puts the consumer at his maximum level of constrained utility. The demand equations state that, other things constant, the individual quantities chosen from the H and Z vectors are totally determined by time and money prices, income, and the relative amounts of time required to consume the different goods.

COMPARATIVE STATICS

The first-order conditions are converted to equilibrium identities and are totally differentiated to get the following system of equations:

$$\begin{bmatrix} 0 & -(P_H+wT_H) & -(P_Z+wT_Z) \\ -(P_H+wT_H) & U_{HH} & U_{HZ} \\ -(P_Z+wT_Z) & U_{ZH} & U_{ZZ} \end{bmatrix} \begin{bmatrix} d\bar{\lambda} \\ d\bar{H} \\ d\bar{Z} \end{bmatrix} = \begin{bmatrix} \bar{H}dP_H & (\bar{H}-1)wdT_H & \bar{Z}dP_Z & (\bar{Z}-1)wdT_Z & [(\bar{H}-1)T_H+(\bar{Z}-1)T_Z-T_w]dw & -dy & -wdT_w \\ \bar{\lambda}dP_H & \bar{\lambda}wdT_H & 0 & 0 & \bar{\lambda}T_H dw & 0 & 0 \\ 0 & 0 & \bar{\lambda}dP_Z & \bar{\lambda}wdT_Z & \bar{\lambda}T_Z dw & 0 & 0 \end{bmatrix}$$

Our interest is in what effect a small change in each of the relevant exogenous variables would have on the quantity of health services the individual demands. Each of these results is derived below.

A Change in Unearned Income

If we hold all of the effects to the right of the equals sign in equation (12) constant except that for y, and we divide through the whole system by dy, we get the following system of partial effects:

(13)

$$\begin{bmatrix} 0 & -(P_H + wT_H) & -P_Z + wT_Z \\ -(P_H + wT_H) & U_{HH} & U_{HZ} \\ -(P_Z + wT_Z) & U_{ZH} & U_{ZZ} \end{bmatrix} \begin{bmatrix} \partial\bar{\lambda}/\partial y \\ \partial\bar{H}/\partial y \\ \partial\bar{Z}/\partial y \end{bmatrix} = \begin{bmatrix} -1 \\ 0 \\ 0 \end{bmatrix}$$

Solving for $\partial\bar{H}/\partial y$ and using Cramer's Rule, we get:

(14)

$$\frac{\partial H}{\partial y} = \frac{\begin{vmatrix} 0 & -1 & -P_Z + wT_Z \\ -(P_H + wT_H) & 0 & U_{HZ} \\ -(P_Z + wT_H) & 0 & U_{ZZ} \end{vmatrix}}{|J|}$$

where $|J| = |\bar{H}|$ in equation (8). This yields:

(15)

$$\frac{\partial H}{\partial y} = \frac{1}{|J|} \begin{vmatrix} -(P_H + wT_H) & U_{HZ} \\ -(P_Z + wT_Z) & U_{ZZ} \end{vmatrix}$$

Solving this equation yields (16):

(16)

$$\frac{\partial H}{\partial y} = \frac{(P_Z + wT_Z)U_{HZ} - (P_H + wT_H)U_{ZZ}}{|J|}$$

This income effect cannot be signed without knowledge of the relative magnitudes of P_Z, wT_Z, U_{ZZ}, P_H, wT_H, and U_{HZ}. If health services were assumed to be normal goods, however, then $\partial H/\partial y$ would be positive. If it could be established that $U_{HZ} \gtreqless 0$, then the income effect would be unambiguously positive.

A Change in the Wage Rate

Using the same procedure as before, but solving for $\partial H/\partial w$, or how a change in the wage rate affects the quantity of health services demanded, we get·

(17)

$$\frac{\partial H}{\partial w} = \frac{\begin{vmatrix} 0 & HT_H + ZT_Z - T & -(P_Z + wT_Z) \\ -(P_H + wT_H) & \bar{\lambda}T_H & U_{HZ} \\ -(P_Z + wT_Z) & \bar{\lambda}T_Z & U_{ZZ} \end{vmatrix}}{|J|}$$

This produces the following equation:

(18)

$$\frac{\partial H}{\partial w} = \frac{T - HT_H - ZT_Z}{|J|}\begin{vmatrix} -(P_H + wT_H) & U_{HZ} \\ -(P_Z + wT_Z) & U_{ZZ} \end{vmatrix} + \frac{\bar{\lambda}T_H}{|J|}\begin{vmatrix} 0 & -(P_Z + wT_Z) \\ -(P_Z + wT_Z) & U_{ZZ} \end{vmatrix} - \frac{\lambda T_Z}{|J|}\begin{vmatrix} 0 & -(P_Z + wT_Z) \\ -(P_H + wT_H) & U_{HZ} \end{vmatrix}$$

Since $T = T_H + T_Z + T_w$, the first term in (18) is merely the effect of unearned income from (15). Substituting from (15), we have:

(19)

$$\frac{\partial H}{\partial w} = (T - \bar{H}T_H - \bar{Z}T_Z)\frac{\partial H}{\partial y} + \frac{\bar{\lambda}T_Z(P_H + wT_H)(P_Z + wP_Z) - \bar{\lambda}T_H(P_Z + wT_Z)^2}{|J|}$$

where the first term on the right is an income effect and the second is a substitution effect. To understand the income effect, suppose all of the individual's time is used in consumption activities, leaving none for market work. If this were the case, then $T = \bar{H}T_H + \bar{Z}T_Z$, and the income term would drop out. Put differently, an increase in the wage would not result in an increase in cash income, since no pecuniary income is earned. Accordingly, even though $\partial H/\partial y$ is positive if health services are normal goods, the increased wage would not lead to larger purchases of health services, at

least not through this channel. On the other hand, if a person receives wage income, then an increase in w would lead to an increase in income, hich would have the partial effect of raising medical purchases if they are a normal good.

If we assume that the individual is compensated for any changes in cash income, then the substitution effect can also be isolated. The increase in wage or opportunity cost of an hour of time raises the time cost of consuming both H and Z. Intuitively, if consuming a unit of H involves more time than the consumption of a unit of Z, than an increase in the wage rate will raise the total price (money plus time) of H relative to Z. Formally, an increase in the wage rate will cause a substitution toward H (and away from Z) if the numerator in the substitution term is positive (given $|J| > 0$):

$$(20)\quad \bar{\lambda}T_Z(P_H + wT_H)(P_Z + wP_Z) - \bar{\lambda}T_H(P_Z + wT_Z)^2 > 0$$

By simple manipulation of equation (20) we get the following result shown by Acton, 1975):

$$(21)\quad \frac{T_Z}{P_Z + wT_Z} > \frac{T_H}{P_H + wT_H}$$

Equation 21 states simply that substitution of H for Z will occur when wages increase if the fraction of the total cost of Z accounted for by time is greater than that for health services. So, while the effect of a change in the wage on the demand for health services cannot be signed, we can say that there will be a positive income effect if health services are normal goods and the individual works in a market job.[23] Furthermore, there will be a positive substitution effect if the purchase of health services is relatively less time intensive than the purchase of other goods.

A Change in Time Spent Working

If we expand the time variable ($T = T_w + T_Z + T_H$) and totally differentiate

the first order conditions, the following equation system results:

(22)

$$\begin{bmatrix} 0 & -(P_H+wT_H) & -(P_Z+wT_Z) \\ -(P_H+wT_H) & U_{HH} & U_{HZ} \\ -(P_Z+wT_Z) & U_{ZH} & U_{ZZ} \end{bmatrix} \begin{bmatrix} d\bar{\lambda} \\ d\bar{H} \\ d\bar{Z} \end{bmatrix} \begin{bmatrix} \bar{H}dP_H & (\bar{H}-1)wdT_H & \bar{Z}dP_Z & (\bar{Z}-1)wdT_Z & [(\bar{H}-1)T_H+(\bar{Z}-1)T_Z-T_w]dw & -dy & -wdT_w \\ \bar{\lambda}dP_H & \bar{\lambda}wdT_H & 0 & 0 & \bar{\lambda}T_H dw & 0 & 0 \\ 0 & 0 & \bar{\lambda}dP_Z & \bar{\lambda}wdT_Z & \bar{\lambda}T_Z dw & 0 & 0 \end{bmatrix}$$

Holding all other effects constant, and solving for $\partial H/\partial T_w$, we get:

(23)

$$\frac{\partial H}{\partial T_w} = \frac{\begin{vmatrix} 0 & -W & -P_Z + wT_Z \\ -(P_H + wT_H) & 0 & U_{HZ} \\ -(P_Z + wT_Z) & 0 & U_{ZZ} \end{vmatrix}}{|J|}$$

(24)

$$\frac{\partial H}{\partial T_w} = \frac{w}{|J|} \begin{bmatrix} -(P_H + wT_H & U_{HZ} \\ -(P_Z + wT_Z & U_{ZZ} \end{bmatrix}$$

Substituting from (15), we get:

(25)

$$\frac{\partial H}{\partial T_w} = w \left(\frac{\partial H}{\partial y}\right)$$

Spending more time at work has an income effect, which is positive for normal goods. It should be emphasized, though, that this assumes that the time spent consuming H and Z is not affected by the additional work time. With that caveat in mind, we can say that as time spent working increases, purchases of health services will increase (if they are normal goods).

A Change in the Cash Price of Health Services

In this case we solve for $\partial\bar{H}/\partial P_H$. By Cramer's Rule this yields:

(26)

$$\frac{\partial\bar{H}}{P_H} = \frac{\begin{vmatrix} 0 & \bar{H} & -(P_Z + wT_Z) \\ -(P_H + wT_H & \bar{\lambda} & U_{HZ} \\ -(P_Z + wT_Z) & 0 & U_{ZZ} \end{vmatrix}}{|J|}$$

(27)

$$\frac{\partial\bar{H}}{\partial P_H} = -\frac{\bar{H}}{|J|}\begin{vmatrix} -(P_H + wT_H) & U_{HZ} \\ -(P_Z + wT_Z) & U_{ZZ} \end{vmatrix} + \frac{\bar{\lambda}}{|J|}\begin{vmatrix} 0 & -(P_Z + wT_Z) \\ -(P_Z + wT_Z) & U_{ZZ} \end{vmatrix}$$

Equation (27) can be divided into an income effect and a substitution effect. Substituting from (15),

(28)

$$\frac{\partial H}{\partial P_H} = -\bar{H}\left(\frac{\partial H}{\partial y}\right) + \frac{\bar{\lambda}\,[-(P_Z + wT_Z)^2]}{|J|}$$

(income effect) (substitution effect)

If H is a normal good, then all variables are positive and $\partial H/\partial P_H$ is unambiguously negative. As the money price of health services rises, purchases should fall.

A Change in the Time Price of Health Services

Solving for $\partial H/\partial T_H$ yields:

(29)

$$\frac{\partial H}{\partial T_H} = \frac{\begin{vmatrix} 0 & \bar{H}_w & -(P_Z + wT_Z) \\ -(P_H + wT_H) & \bar{\lambda}_w & U_{HZ} \\ -(P_Z + wT_Z) & 0 & U_{ZZ} \end{vmatrix}}{|J|}$$

(30)

$$\frac{\partial H}{\partial T_H} = -\frac{\bar{H}_w}{|J|} \begin{vmatrix} -(P_H + wT_H) & U_{HZ} \\ -(P_Z + wT_Z) & U_{ZZ} \end{vmatrix} + \frac{\bar{\lambda}_w}{|J|} \begin{vmatrix} 0 & -(P_Z + wT_Z) \\ -(P_Z + wT_Z) & U_{ZZ} \end{vmatrix}$$

This is exactly analagous to the cash price effect. As the time cost of health services rises, ceteris paribus, the amount purchased falls (if H is a normal good).

Chapter 6. A CASE STUDY OF PRACTITIONER USE IN THE PHILIPPINES

In this chapter, we present results from a case study of the demand for medical services in the Bicol region of the Philippines. Demand models are estimated for adult outpatient care, child outpatient care, prenatal care, obstetrical (delivery) care, well-baby care, and infant immunizations. The structure of these models follows as closely as possible that suggested by the theoretical model derived in the previous chapter and the ideas presented in chapter 3.

THE BICOL REGION OF THE PHILIPPINES[24]

The Bicol region lies approximately 300 kilometers southeast of Manila on Luzon Island. The region consists of four provinces on Luzon (Camarines Sur, Albay, Sorsogon, and Camarines Norte) and two island provinces (Catanduanes and Masbate). The area regularly suffers from destructive typhoons and is generally extremely wet, with a mean annual rainfall of about 140 inches. Like the rest of the Philippines, it is hot year-round, with temperature variations depending more on altitude than on season. The terrain is mountainous with many isolated and inaccessible areas.

The Bicol region's population in 1980 was 3.47 million people. In 1975, 83 percent of the population lived in rural areas, with about half of the remaining population living in the region's three major cities, Legaspi City, Iriga City, and Naga City. The population is considerably more rural than in the rest of the Philippines (68 percent), but the rural/urban distribution is similar to that of many low income countries. Approximately 90 percent of the people are literate, although few attend school beyond the sixth grade.

The Bicol region is characterized by a low level of infrastructure development. The area is served by a somewhat inaccessible and unreliable Philippine National Railway line to Manila and by an all-concrete highway, completed in 1976, that runs through the mainland to Manila. The road network appears to be large (3,744 kms. of public roads servicing an area of 17.6 million square kilometers), but 68 percent of the roads are unpaved and many are impassable during the rainy season. Twelve of the larger towns and cities have telephone systems, but these provide only local service within the towns, with some long distance service to Manila. The telegraph system is more accessible and is widely used. There are 2 television stations and 16 radio stations in the area.

Approximately 17 percent of the dwelling units were supplied with electricity in 1978, a level about average for areas outside of Manila and beyond the central part of Luzon island. In 1970, the Bicol region was ranked third of the 12 regions in the number of households without safe water (49 percent) and fourth in the number of households without sanitary toilets (88 percent).

According to a national expenditure survey, average family income in 1975 was 4,280 pesos ($535 at 8 pesos to the dollar), which was three-fourths

the Philippines national average at the time. Using a poverty line of 827.4 pesos per capita for rural families (or 4,964 per average household), the World Bank classified 55.4 percent of the families in the Bicol region as poor in 1975. By this standard, the region accounted for 7.6 percent of the country's population in 1975 but 9.2 percent of the nation's poor. It was third highest among the 12 regions in the incidence of rural poverty.

The predominant economic activities in the Bicol region are farming and fishing, both of which tend to be done on a small scale and as family-owned businesses. To be more specific, in 1979, agricultural, fishery, and forestry production accounted for 51 percent of the area's gross domestic product (GDP). About 18 percent of regional GDP was accounted for by mining, manufacturing, and construction; the remaining 31 percent of GDP was accounted for by transportation, commerce, and services.

Approximately 40 percent of the Bicol region's population ten years old and above was gainfully employed in 1975. Agriculture, fishing, and forestry accounted for 66 percent of the employed population; mining, manufacturing, and construction accounted for 11 percent of the employment; and transportation, commerce, and services accounted for 21 percent. Of the total group employed, 30 percent received wages or salaries, 52 percent ran their own businesses, and 18 percent were unpaid family workers. The unpaid family workers were concentrated in farming and fishing, as were those who owned their own businesses.

A 1971 agricultural census found that 59 percent of the families in the Bicol region depended on farming, fishing, or farm labor for their income; these families accounted for 78 percent of the poor, however. Or, looked at another way, the 66 percent of the region's working population employed in agriculture or fishing in 1979 produced only 51 percent of the area's GDP.

A few large-scale industries--a coconut oil company, a pulp and paper company, a sugar processing company, a Coca-Cola bottling plant, and a Pepsi Cola bottling plant--accounted for most of the opportunities for jobs in the manufacturing sector, as well as for a large proportion of manufacturing output in the region. The service industry is characterized by many small firms, but the government accounts for almost half of the employment in this sector.

The preceeding description suggests that the Bicol area is similar to many other low income regions of the world in terms of dependence on agriculture, the low level of agricultural incomes, the informality of employment, the lack of permanent job opportunities, the low quality and inadequacy of existing infrastructure, the unhealthiness of the environmental conditions, and the extreme poverty of many households. On the other hand, the average level of income in the Bicol region is higher than that of many of the poorest countries in Africa; the literacy rate is quite high; and the area is favored with abundant good land and rich fishing grounds. As with any other area, therefore, the Bicol region is not some physical manifestation of the average situation in all low income countries. However, lessons learned from the study of this area could be broadly applicable as long as care is taken to understand which results are idiosyncratic to the region.

There is a major effort underway by the Government of the Philippines, the Asian Development Bank, and the U.S. Agency for International Development to complete an integrated development project whose goal is to raise the socioeconomic level of the Bicol region to the Filipino national average by 1990. This project, the Bicol River Basin Development Program, began in 1973. Its major objectives are to improve agricultural productivity through double rice cropping, irrigation, and better drainage; to build and

maintain an improved road system; to promote more business activity and investment; and to improve household water supplies, sanitation, and health care. The data used in this study were collected as part of the evaluation effort of this regional development project.

THE HEALTH SERVICE SYSTEM IN THE PHILIPPINES[25]

The health care system in the Philippines is structured closely along the lines of the typical system described at the beginning of chapter 2. The Philippines situation is somewhat different from that in other low income countries, however, in that it has a fairly high physician-to-population ratio and a relatively large and widely dispersed system of private clinics and hospitals. As mentioned earlier, the ratio of doctors to population was 1:250 in Manila and 1:5000 in rural areas in 1970. In 1974, there were 1,565 rural health clinics (RHU), 411 puericulture centers, and 994 private clinics. There were 32,330 hospital beds owned by the department of health and 26,082 private hospital beds. There were no major differences in the distribution of the public and private facilities. About 40 percent of the public hospitals were located in Manila (which had 13 percent of the population in 1974). Combining the RHUs and the puericulture centers, 93 percent of them were located outside Manila, but so were 89 percent of the private clinics. These figures roughly suggest that the public and private medical sectors are extensive, are approximately equally important, and are dispersed in about equal proportions throughout the country. The focus on physicians, however, hides a shortage of auxiliary personnel. In the Bicol region in 1979, for example, there were 1,667 people per hospital bed and 5,263 people per physician, but there were 8,333 people per nurse and 9,091 people per

trained midwife. Thus the ratios move in exactly the opposite direction of the usual expectation. There is a relatively large supply of highly trained and expensive doctors (and hospital beds) but a fairly inadequate supply of nurses and midwives.

The government facilities generally provide free care to all clients, without reference to their incomes. The private hospitals and clinics generally provide fee-for-service medicine (government doctors, too, are allowed to engage in private practice after hours), but the private hospitals are required by statute to reserve 10 percent of their beds for charity cases.

In 1972, the Philippines government instituted a national health insurance system (Medicare) which covered the half million government employees and 3.5 million regularly employed private sector employees. Benefits were initially paid only for inpatient care, but the intention is to broaden the coverage to include outpatient and obstetrical care, and to extend membership to all citizens. The financing is based on a fund containing private contributions (payroll deductions) matched by government contributions. The medicare system does not include its own set of institutions; rather, it acts like an insurance system paying most inpatient hospital and physician fees (as well as pharmaceuticals) if care is sought from an approved institution and practitioner. This insurance scheme, at least in its initial phases, will tend to subsidize private inpatient care for people working in formal wage-oriented jobs and will not affect either the medical care or the behavior of most rural citizens.

BICOL MULTIPURPOSE SURVEY (1978) AND BICOL MULTIPURPOSE SUPPLEMENTAL SURVEY (1981)

The Bicol Multipurpose Survey (BMS 78; see Popkin and Roco, 1979) surveyed a random sample of 1,903 households in 100 barangays located in the three mainland provinces of the Bicol region. Information was gathered at the community (barangay) level on the condition of roads and services, environmental sanitation, numbers and types of private businesses, and availability of government facilities (school, extension, health, etc.). Household information was collected on the condition of the dwelling, ownership, assets, and a wide variety of economic and demographic variables. Individual information on about 12,000 household members and another 5,000 unrelated residents was also collected. This information included extensive income and time allocation data; health, child-rearing, and pregnancy-related information; and an extraordinary compilation of demographic variables for each individual.

A problem was encountered, however, in trying to use the health data from this survey in demand models. Respondents had been asked the total amount that had been spent for each illness or delivery experience instead of the price of each visit that had been made.[26] As a consequence, while we needed price information to use as an explanatory variable for predicting the types of medical facilities visited, what the survey supplied was an expenditure variable which itself was dependent on the type of visit chosen.

It was neither feasible nor desirable in 1981 to return to all of the 1,903 survey households to correct this problem. Instead, we undertook a survey of virtually every public, private, and traditional medical facility (BMSS 1981; see Griffin et al., 1982) that served the 100 barangays surveyed in 1978. From each of 518 facilities that were visited, we

gathered data on payment practices, hours of operation, and medical personnel in practice there. In addition, we carefully tabulated information for each facility on the barangays it served as well as the distance, the cost of travel, and the patients' usual mode of transportation from each barangay to the facility. Much of the information on these items has already been used in chapters 2 and 3 for descriptive purposes.

In addition, we gathered data from each facility on the types of services offered. For adult outpatient care, child outpatient care, home deliveries, clinic deliveries, prenatal care, well-baby care, child immunizations, and adult vaccinations, we asked facilities the usual price for one visit, the usual practitioner seeing each type of patient, and the usual waiting time required for each service. We also asked facilities about services extended for five specific illnesses: tuberculosis, gastroenteritis, influenza, pneumonia, and bronchitis. According to Philippine government health statistics, these illnesses are the five leading causes of morbidity in the country. For each of these illnesses, we collected length of treatment, price, practitioner, and waiting time data. We also inquired about the usual prescriptions, the availability of drugs, and the price of the usual prescription for each illness.[27]

Combining these two surveys created a unique set of data which made it possible to reconstruct statistically the market for outpatient medical services in the Bicol region. Details follow on how this was done.

COMMON STRUCTURE OF THE MODELS

Underlying Rationale for the Approach Used

In conventional demand analysis consumers are assumed to allocate their budgets simultaneously over all goods and services they are interested in purchasing. Accordingly, the prices and quantities of all goods purchased should enter a system of demand equations; it would be a misspecification of the model to break off one set of demand equations, such as the demand for medical care, and estimate the demand for those services in isolation from all other consumption behavior.

The assumption of weak separability, however, allows the analyst to do such individual service analysis. Weak separability implies a specific form of behavior for the consumer; namely, that he makes an initial allocation of his budget to different categories of goods, such as to food, shelter, clothing, transportation, and medical care, and then maximizes utility within each of the categories without further reference to the others. In constructing the categories, it is assumed that the structure of prices within each grouping stays the same; in other words, that the relative differences in the prices of goods within each category tend to be constant. The important point of the assumption is that after the initial allocation of his income to the different groupings, the consumer is assumed to behave in such a way that consumption decisions within each category, or branch, of his budget are made independently of decisions in other branches. Only at the time of the initial allocations are the branches considered together. These assumptions allow the analyst to isolate one category of consumption goods, such as medical services, and estimate demand equations for them. Or, to reverse the thought process, this behavior on the part of the analyst

imposes on the consumer the assumed consumption behavior just described (Deaton and Muellbauer, 1980).

In the analysis that follows, the assumption of weak separability is the conceptual foundation which permits the work to be structured as it is. Furthermore, the assumption that the price structure within groups is constant over time allows us to combine the prices collected in our 1981 survey with the household and individual information collected in the 1978 survey. We are not arguing that the prices for medical goods and services did not change over this three-year period, only that if they did change, they changed in the same proportions. Furthermore, we are assuming there were no major changes in the medical market over this three-year period which would have disrupted the price structure (such as major infusions of new government facilities and personnel). The Bicol River Basin Development Program will eventually field 400 new "barangay health aides" as part of the Bicol Integrated Health Nutrition and Population Project which began functioning in 1981. Sixty-five of these health aides were already working out of existing government health clinics surveyed in the BMSS 1981, and only 94 were to be working by 1982; so their impact on the medical market (e.g., relative prices and accessibility) was probably extremely small over the three-year period between surveys.

In addition to the assumption of separability, a second distinguishing feature of the models presented below is that cash costs and time costs are assumed to enter the budget constraint of the consumer as equally important allocative factors. Moreover, both time and cash costs enter the models as price variables that are uniquely connected with each facility. The consumer has no control over the prices or time costs associated with each facility; he can only decide whether or not the facilities are affordable. As mentioned

earlier, this format differs from that of the household production model in which time is an endogenous variable over which the household has control.

Reconstruction of the Bicol Medical Market

The BMS 1978 household survey provided information on the health-seeking behavior of 1,104 individuals reported to have been sick in the month previous to the survey. It was possible to add appropriate individual, household, and barangay data to 1,025 of these observations. Dependent variables were constructed by classifying whether each person sought medical care at all, and, if so, whether it was from a traditional practitioner, a public clinic (or hospital), or a private clinic (or hospital). Since our interest was limited to outpatient visits, all individuals who had been confined were deleted (57 observations).

In addition, 589 women had either given birth during the year prior to the survey or were pregnant at the time of the survey. Of these, 520 were respondents, which means that they were either the head of the household or shared that role with a husband. The other 69 pregnant women were simply members of their households.[28]

For the women who were (or had been) pregnant, relevant household and individual data from other files were added to the observations, and dependent variables were constructed for prenatal care, delivery type/location, well-baby care, and infant immunizations. The numbers of observations which survived without missing values and after a number of manipulations are shown for each model in the appendix. The number of observations differs for the various models (e.g., prenatal, delivery, etc.) for a number of reasons. Some women who reported prenatal visits had not yet delivered their babies or had suffered a miscarriage, and so had reported

no delivery information. Similarly, some deliveries resulted in stillbirths and obviously were connected with no well-baby or immunization information. The major block of observations lost for all the models was the sample of 69 "nonrespondent" pregnancies. This loss was because work-related data were not available for these women. Furthermore, information on the number of living children and the sex of the baby was collected only for respondents. Thus the maternal and infant health care sample analyzed represents female household heads rather than all females of childbearing age in the region.

For each of the observations in the six models that were estimated, it was possible to assign a barangay of residence to the individual. From the medical facility survey conducted in 1981, it was possible to isolate exactly which public, private, and traditional institutions (or practitioners) drew patients from each of the 100 sample barangays. Because all the relevant price, time, practitioner, and service availability information was easily accessible, it was possible to connect with each individual observation a reasonable facsimile of the medical market facing that person's household, including visit and drug prices, time and usual transport costs, distance, and other facility-level variables.

Because there was inevitably some overlap in the services available to each barangay (for example, two private clinics both offering adult outpatient care to the same community), a decision had to be made regarding the treatment of such observations in the construction of the medical markets. One option was simply to average the price variables over the relevant facilities. We decided, however, that a mean price or a mean distance for two facilities several kilometers away from each other was meaningless. Average prices are disembodied data that are not comparable to prices that

can be associated with specific concrete facilities. Moreover, average prices for several different facilities are not part of the set of variables to which people react.

As a consequence, we decided to choose, according to the criterion of shortest distance from the barangay served, one particular facility from each set of multiples. For each barangay, we identified the least distant of each type of facility offering each particular service, and we kept only those facilities in each category (public, private, traditional) meeting this least-distant criterion. If multiples still remained, the facility offering the particular service at the lowest cash price was selected, and we kept only facilities meeting this criterion (and having already passed the least-distant test). If there were still multiples because of ties, we randomly selected one facility for the final group. The result of this weeding-out process was one facility of each of the three types, for each type of service (outpatient, delivery, etc.), for each of the 100 barangays.

In using this process, we obviously assumed that people reacted first to distance and second, to price, and we attempted to mimic this behavior. It is certainly possible that other items might be important in this decision-making process, such as quality, drug costs, or availability of transportation, but none of these criteria would have been less arbitrary than the ones we chose. For traditional practitioners, family ties and other personal variables may be very important for choice of practitioner. If it is assumed that markets are working, however, any traditional practitioner in a specific community should charge prices roughly similar to any other, so any particular one we chose would work reasonably well to approximate market conditions.

In actual practice, the need to eliminate multiple facilities was not

a major problem. The initial criterion of whether the service in question was available eliminated a large number of traditional practitioners, and multiples for public and private facilities tended to occur predominantly in urban areas, where well-functioning markets would probably cause prices to be fairly well standardized.

Qualitative Dependent Variables

Demand theory constructs systems of demand equations based on continuous dependent variables measuring the (positive) amounts of each good or service purchased. In the medical market, the dependent variables would take the form of the number of visits to each practitioner (although the proper unit should be some sort of quality-adjusted number of visits). In the six models estimated here, only one of the dependent variables (number of prenatal visits) fits this quantitative mold. All of the others are of a qualitative nature (discrete choices); for example, a well-baby visit versus no visit, a clinic delivery versus a modern home delivery versus a traditional home delivery, and so on (see appendix tables A-1, A-5, A-9, A-11, A-14, and A-16 for the form of each dependent variable).

In these cases, ordinary least squares cannot be used as an estimation technique because the dependent variable is not normally distributed, the error terms are heteroscedastic, the estimates of the coefficients are inefficient, and the standard errors are inconsistent (making significance tests incorrect), to name just a few of the many problems that are created (Judge et al., 1980). As a result, three other techniques, all of which overcome these problems and are more appropriate to the models being considered, have been used to estimate the models. Each technique is briefly described below.

Multinomial logit technique. This procedure was used in estimating the outpatient models and the delivery model. Taking the outpatient models as an an example, the following system of three equations was estimated:

$$\log \frac{P(\text{Public Visit})}{P(\text{Traditional Visit})} = X\beta_{\text{Public}}$$

$$(1) \quad \log \frac{P(\text{Private Visit})}{P(\text{Traditional Visit})} = X\beta_{\text{Private}}$$

$$\log \frac{P(\text{No Visit})}{P(\text{Traditional})} = X\beta_{\text{No Visit}}$$

Because the outcomes are mutually exclusive, the probability that a traditional visit will take place is equal to 1 minus the sum of the probabilities of using the other three alternatives:

(2) P(Traditional) = 1 - [P(Public) + P(Private) + P(No Visit)]

The coefficients estimated for these equations can be used to construct all possible comparisons between the dependent variables; appropriate tables in the appendix report the results.

The conditional logit model allows for the simultaneous consideration of an entire set of choices (simultaneous results are reported in the general conclusion to this chapter), but the actual comparisons made are binary in nature (as equations [1] illustrate). The conditional logit technique is not based on the assumption of normally distributed error terms, which is the approach econometricians prefer to take; however, this shortcoming is more than compensated for by the almost perfect appropriateness of this technique for the multiple unordered types of choices examined in the outpatient and delivery models.[29]

Conditional probit technique. The conditional probit technique is used in the estimation of models for the decisions to seek well-baby care and to have the infant immunized. Each of these choices is dichotomous in nature with a yes/no (1/0) dependent variable; thus ordinary least squares would be inappropriate for reasons analogous to those listed in the previous section.

The logit technique could alternatively have been used for these models, and quite similar results would have been obtained. The probit technique was used, however, to take advantage of the convenient properties of the normal distribution, on which it is based.

The interpretation of the estimated coefficients of the probit model (as for the logit model) is made in terms of the contribution each variable makes to the probability of choosing the alternative of well-baby visits or immunizations. Thus the results can be difficult to interpret in economic terms, although we try to overcome this problem by making unitless comparisons in the general conclusion to this chapter.

Tobit technique. The continuous dependent variable used in the prenatal model has no values less than zero (it is truncated at the value zero). No woman can possibly make a negative number of prenatal visits. Some women may have had characteristics which would have led (at least conceptually) to a negative number of visits, yet they did not have that option and were massed at zero visits, along with the observations that would be predicted to fall exactly at zero based on the respondents characteristics. Because of the truncation of the dependent variable, the error term is not normally distributed and is heteroscedastic. The estimates derived from an ordinary least squares (OLS) regression might be unbiased, but they woul be inefficient, and the ordinary tests of significance would be incorrect because of

nonnormality of the distrubance term (Kmenta, 1971). These problems are quite familiar and are corrected by using the tobit technique.

Treatment of the Value of Time

We argued in previous chapters that time should enter our demand models as a price weighted by the individual's shadow wage rate. Time is specifically treated in this way in the model formulated in chapter 5.

In estimating our models, however, we were unable to weight the time costs in this way because wage data from the 1978 survey had inadvertently been lost when the data were originally transcribed to tape.[30] Some value of time data survived for the 520 pregnant or recently delivered mothers who were also respondents, but it was impossible to solve the problem of the proper units to use in interpreting this information. The problem of estimating shadow wages in Third World labor markets is extraordinarily important but also very difficult, since wage labor accounts for such a small fraction of income, hours are not standardized, in-kind income is substantial, jobs tend to be informal, unpaid agricultural work is predominant in many rural situations, and cottage industry is pervasive.

While we believe these problems all have reasonable solutions, they could not be resolved adequately for proper use of the value of time information available for the mothers. Consequently, in all of the models, time costs enter in their raw form, unweighted by individual shadow wages. This is equivalent to assuming that time costs have a constant deterrent effect across all individuals. In the models for which mothers are the individuals of interest, a dummy variable was constructed on the basis of whether the mother worked away from home or worked at home (or had no occupation at all) in order to get some measure of the constraints operating

on the uses of her time. In models where it is appropriate, a dummy variable also appears for each mother's number of living children. Although this variable may be related to many behavioral characteristics, one possible interpretation is that it provides a measure of the time constraints operating on the mother who stays home.

Income Variable

A second casualty of the lack of individual wage data was the loss of a household income variable. Since assets and income are closely related, however, we concluded that the present value of household assets would be an excellent proxy for income. The results seem to confirm this assumption.

The asset variable used includes the respondent's estimate of the value of the house (if owned); the value of the house lot (if owned); and the value of furniture, appliances, and vehicles. These are personal assets as opposed to, say, farmland, businesses, and rental dwellings, which are not only assets but also sources of income. Although inclusion of income-earning assets would have given a more complete picture of household wealth, it would have reduced the value of assets as a proxy for income, because it would have weighted the variable towards people who did not depend on wage labor for their income. For example, an individual working full time as a school teacher might have a relatively high income but own only a house and furnishings, while a poor farmer might have little income but own a substantial amount of land. Thus, in using only personal assets, we are assuming that their value is a good proxy for relative income differences because they reflect the amount of income coming into the household, no matter what the source.

Consequently, we are confident that the asset variable we use is a good

proxy for income and probably an adequate representation of wealth as well. The major loss because of this approach is the ability to distinguish the independent effects of wealth and income.

Waiting Time Variables

We suspect that the waiting times facilities reported tend to be inaccurate and complimentary to the facilities. For instance, table A-1 reports a mean waiting time of only three to five minutes for adult outpatients, no matter what the facility. For all of the 426 facilities offering adult outpatient services, the mean wait reported was 3.2 minutes; 316 facilities (74 percent) reported no wait at all.

In contrast, the mean waiting times the sick adults in the 1978 survey reported were 26 minutes for traditional practitioners, 90 minutes for public facilities, and 108 minutes for private facilities. These seem much more plausible.

As a consequence, the outpatient models were run separately using both the facility-reported times and barangay-level means for the patient-reported waiting times. Surprisingly, the results were virtually identical (similar signs and significance levels), which indicates that even though the facilities were quite a bit more sanguine about their speediness than were their patients, the relative differences among facility-reported times were probably similar to the differences reported by the patients. Consequently, the results for the facility-reported waiting times are reported, because this form of the variable is more consistent with the conceptual basis of the models than is average patient-reported waiting time.

Mathematical Form of the Independent Variables

The model constructed in chapter 5 offers no guidance as to the mathematical form of the independent variables. Economists usually use linear models, although there is little theoretical justification for this approach.

In our models, a number of variables could plausibly enter the calculus in a nonlinear manner. Evidence presented in chapter 3 suggests that patients may not be particularly sensitive to time or travel costs when these costs are low, but that as the costs pass a certain threshold, their deterrent effects increase substantially. This situation would imply that the waiting and travel time variables should enter the models in exponential form. The adult outpatient models were estimated under this assumption, but, as in the case of the patient-reported waiting times, the new specification had no effect on significance tests or coefficient signs. Although the data cannot be expected to reveal the proper functional form, the stability of the results was interpreted as a lack of evidence that the linear form was incorrect; so the linear results are reported.

By virtue of the fact that individuals consider much medical care to be essential, income might not necessarily enter the models as a continuous variable. Different categories of income might affect medical behavior differently. For example, a lack of income may have little effect in deterring people from seeking some type of care, but below some threshold level, it may force them to seek care from traditional providers, public clinics, or pharmacies. Increases in income beyond that level might catapult patients into a new category of behavior (seeking care from more distant sources, using private practitioners, and so on). In other words, income may have a rachet effect that is lost when it is measured continuously. If the hypothesized threshold level is very low or very high, that would be

an important piece of information for policymakers. We were not able to test this proposition, however, because of the lack of income data.

These are just two examples of phenomena that might be missed using a simple linear model and continuous explanatory variables. Another problem lay in the interactive nature of many of the independent effects. An issue related to this interactive possibility, the question of gravity of the illness, is addressed in a later section.

Variables Used

The appendix contains descriptions and sample statistics for the variables used in each model. In most cases the variable definitions are self-explanatory, but the less obvious ones are clarified below.

Traditional practitioners include all hilots (midwives) and herbolarios (healers). A total of 194 hilots and 101 herbolarios were surveyed in 1981. Public facilities include government-sponsored rural health clinics or city health offices (50), public hospitals (15), puericulture centers (5),[31] family planning centers (3), and a public maternity clinic. Private facilities include private clinics or physicians (60), private hospitals (40), maternity clinics (3), private nurses (5), and private midwives (41). The dependent variable in each case depends on where the sick or pregnant individuals said they sought care; all include the possibility of no visit and visits to any of the above-named facilities.

Perceived quality of the provider is one of the most important variables explaining the decision of where to seek care. Other studies have proxied quality by using years of training or number of board certifications to differentiate physicians. This approach is inappropirate where traditional practitioners are concerned, since their quality cannot be measured by

degrees. To get around this problem, we attempted to develop quality measures that required as little subjective evaluation on our part as possible. For public and private facilities we created a dummy variable (yes/no or 1/0) for whether patients of each particular type (adult out-patient, delivery, etc.) were usually seen by a doctor at the facilities. For traditional practitioners, we created a dummy for lack of quality which was equal to 1 only if the practitioner treated none of the five diseases in our survey (TB, flu, pneumonia, bronchitis, and gastroenteritis) and was equal to 0 otherwise. These are the least arbitrary measures we could construct. Strictly speaking, quality should be used to weight the dependent variables; in this situation, that is, given the 0/1 form of our quality measures, there was no choice but to put them on the right-hand side of our equations as explanatory factors.

Drug costs were also calculated for each facility. We knew the usual prescription and its cost (by facility) for each of the five illnesses appearing in the 1981 facility survey. We constructed an index of drug costs for each facility by weighting the prescription prices according to the incidence of each disease (as reported in Philippines national health statistics). This index should provide a reasonable estimate of the relative cost of drugs for the three types of facilities.

The variable labelled "illness is serious" is a respondent-reported evaluation. Respondents were asked whether each illness was serious, very serious, or not serious. If they reported "serious" or "very serious," then the "illness is serious" dummy variable takes on a value of 1.

As argued in chapter 3, there are a number of reasons to include supply variables in the demand equations. In the models we estimated, for example, while we chose the closest of each type of facility, there is no reference

to the range of choices actually available in each locality. To create a supply index for each type of practitioner, we added up the number of government facilities, private clinics or hospitals, and traditional practitioners who claimed to serve each barangay. When these controls for relative supply were included in the models, however, they had the effect of removing whatever significance could be attributed to the transport time and transport cost variables already in the models. This led us to the obvious conclusion that in choosing the closest facilities for each barangay, we were actually getting a good measure of relative supply. Consequently, adding another supply variable to the models would measure the same effect twice; so it was not used.

Each model has a dummy variable in it for whether the individual in question is covered by health insurance. Often health insurance covers only inpatient care and has no provision for obstetrical care. We could not tell from the survey, however, exactly what types of care were covered for households which had health insurance. The insurance dummy was left in every model, however, on the assumption that even if individuals were not covered for the particular service in question, the fact that they were covered at all should affect their behavior. For example, being covered by hospital insurance would produce a positive income effect by reducing the price of hospital care and reducing the amount of money that would have to be set aside for emergencies. Moreover, coverage by insurance, which does not usually allow payments to traditional healers, might cause the individual to become more oriented towards modern medicine. It also might allow for greater experimentation by reducing the total bill for care.

ADULT OUTPATIENT MODEL

Table A-1 contains definitions and sample statistics for the variables included in the adult outpatient model. Logit estimates for this model are reported for three different samples: for the entire sample of adult outpatients (table A-2), for the sample whose illnesses were classified as serious or very serious (table A-3), and for the nonserious illness sample (table A-4). It would have been preferable to interact the "serious" variable with the price, time, and income variables on the assumption that more desperate cases are less sensitive to these items, but as a practical matter the model could not be expanded to include interactive effects.[32] By splitting the sample between serious and nonserious cases, it is possible to compare the results, but significance tests on the interactive effects are lost. The approach is statistically equivalent to interacting the seriousness variable with every other variable in the model.

In the following analysis, results are reported, interpreted, and compared for the three adult samples. Reference is made primarily to the statistically significant results (minimum of 10 percent level) except where the lack of significance has meaning. Each equation contains at least one set of prices whose effects are impossible to interpret. For example, the equation for the choice of public or private modern practitioners contains as independent variables the prices of these practitioners but also the prices associated with traditional practitioners. While traditional prices certainly enter the individual's calculations in choosing between public and private visits, they must do so indirectly, and we cannot know in advance how they will affect the final choice. Consequently, we view the traditional set of prices in this situation to be control variables and

do not attempt to interpret the meaning of their estimated coefficients.

In both the adult and child outpatient models there are nine of each type of price effects, therefore, for which signs can be predicted. In the public versus traditional choice, public and traditional prices (and time costs) will be expected to have negative effects on the probability of using the respective services. Private prices will be considered irrelevant. Similarly, private and traditional prices will have predicted effects in the private versus traditional choice, traditional prices alone will have a predicted sign in the no visit versus traditional choice, public and private prices should be signable in the public versus private choice, public prices will have an expected sign in the no visit versus public choice, and there will be expectations for the sign of the coefficient on private prices in the private versus no visit choice.

Cash Prices

The cash price effects for the full-sample adult outpatient model tend not to be statistically significant. Traditional and modern private prices have the expected signs but are never significant, while public prices consistently have the "wrong" sign and are significant in one case, the choice between public and traditional visits. This means that the more costly is a public visit, the more likely the adult outpatient is to choose a public clinic over a traditional practitioner. This appears to be an illogical result, but it may simply be a quality- or institutionally-related phenomenon. None of the government clinics in our sample charged a price for adult outpatient services, so when the price is nonzero for an observation, that means that the closest public facility was either a hospital or a puericulture center, both of which charged nominal fees. Consequently,

the coefficient sign for public prices may be positive for a number of understandable reasons. Patients may prefer public to traditional services in these cases simply because they prefer to pay for care; the choice may be related to the perceived higher quality of the hospitals and puericulture centers relative to government clinics; or there may be other institutional factors involved. At any rate, this effect is consistent with what was found by some other studies cited in chapter 3.

The transportation cost variables have the expected signs in seven of nine cases, but are never statistically significant. Consequently, we must assume that transport cost does not affect the choice of which practitioner to use.

Public drug costs are a statistically significant deterrent to using public facilities in the choice of public or traditional visits. Private drug costs, on the other hand, are positively related to the choice of private over public practitioners. Thus drug costs seem to be a deterrent in the case of public facilities but have the opposite effect for private practitioners.

Insurance coverage for the sick person appears to have no effect on choice of practitioner.

Time Costs

None of the travel time or waiting time coefficients are significantly different from zero, and the signs tend to be the opposite of what might be expected.

Quality

The quality variables also fail to explain the patterns of variation in use

in most cases. For traditional healers, however, those who treat none of the five illnesses covered by the BMSS 1981 survey are less likely to have patients opt for their services relative to choosing no visit, when that is the alternative.

Assets

The asset variable is statistically significant in two equations. A higher value of assets increases the probability of a private visit relative to a traditional visit and the probability of no visit relative to a traditional visit. In each case, however, the magnitude of the effect is quite small.

Demographic Variables

As a person gets older, the results on the age variable indicate that any type of practitioner tends to be preferred to none. In two cases--traditional versus no visit and private versus no visit--this effect is statistically significant at above the 10 percent level. For the public versus no visit choice, the effect is significant at the 14 percent level. While age would be expected to increase the probability of traditional visits when it is taken as a proxy for a more traditional orientation, it apparently does not affect the choice between traditional and modern practitioners in our model. It simply increases the probability of all types of visits.

Sex is significant in two cases. Males are more likely to use a private practitioner when the alternative is a public clinic, and they are more likely to use no clinic in the choice between no visit and a public visit. At about the 20 percent sifnificance level, there is also a preference by males for

traditional practitioners over public ones; thus if this coefficient is believable, the bias against government facilities for males holds no matter what the alternative.

The urban variable has no statistically significant coefficients. More educated people, however, seem to behave similarly to older people in prefering some practitioner over none. Education apparently has little if any effect on the choice of which practitioner to use.

As expected, the perceived seriousness of the illness has a strongly significant effect in most cases. The fact that an illness is serious will in all cases lead to a preference for some practitioner over no practitioner, a private practitioner over a traditional practitioner, and (at the 15 percent level of significance) a private practitioner over a public practitioner. The only decision that apparently is not affected by the gravity of the illness is the choice of public relative to traditional care.

If the three models in tables A-2, A-3, and A-4, are compared, a few additional points can be made about the effects of the seriousness of the illness. One would expect that all prices and time costs would be less important to seriously ill patients than to other patients. Price and time costs are not significant for the sample of all adults, however, and they work no better to explain the behavior of the nonseriously and seriously ill samples. For the seriously ill sample, however, transport time to the traditional practitioner becomes a statistically significant deterrent to using that source when the choice is between private and traditional or no visit and traditional.

For seriously ill patients, the asset variable loses its significance in every case, a fairly logical finding. In addition, the demographic variables tend to lose their explanatory power when the illness is serious.

The upshot of this analysis is that seriously ill patients are much more likely to use private practitioners than are nonseriously ill patients (who are more likely to stay home according to the frequencies table A-1 gives), and the differences in behavior are caused almost exclusively by the seriousness element alone, rather than by the economic or demographic variables included in the model. A second point is that the nonseriously ill patients come from a sample whose mean income is 41 percent higher than the average income for the seriously ill patients (with an enormously larger standard deviation). This may indicate that poor people are more likely to be seriously ill, that wealthier people are more likely to report illness, or that wealthier people simply buy more medical goods (along with more of almost everything else).

The fact that the seriously ill sample is so much poorer, on the average, makes the preference by this sample for private visits, and its insensitivity to the costs, quite interesting. If poorer adults tend to consider themselves sick only when they are seriously ill, and they use private sources of care because of the perceived seriousness of the illness, then the poorer segments of the population tend to be missed to a great degree by the government clinics. This discovery is tentative, of course, but if it is true, it indicates that care for poorer adults could be more directly improved by subsidizing their care at private clinics than by supplying free government clinics that they do not consider to be as appropriate for their illnesses.

Conclusions

The major conclusion to be drawn from the adult outpatient model is the unimportance of virtually all of the economic variables (except, in a minor

way, drug costs) in determining choice of practitioner. This result is not without meaning, of course, since reference to table A-1 demonstrates that none of these costs is trivial. Assets (our proxy for income) tend to have the expected effects, but the magnitudes are almost imperceptible. Age, education, sex, and the seriousness of the illness are the major determinants of facility choice behavior for adult outpatients.

CHILD OUTPATIENT MODEL

Estimation for the child outpatient model was also carried out for three different samples. First the model was estimated for all children (ages 0-13), then for young children (0-5), and finally, for older children (6-13). We did not expect radically different results for the different groups; rather, we chose this approach because of the interest of policy makers in the zero to five age group. Tables A-6, A-7, and A-8 contain the estimated coefficients and significance tests for the three samples; table A-5 contains a description of the variables and sample statistics. The child outpatient model is identical to the adult outpatient model except that the prices refer to child outpatient care, education refers to the mother's highest grade completed, and the dummy variable for whether the mother stays home or works away from home is included on the assumption that she is the principal decision-maker for these samples.

Cash Prices

For the sample of all children, the price variables tend to have as little explanatory power as they did in the adult outpatient model. A number of specific cash price effects are statistically significant, however. Higher

prices for traditional practitioners increase the probability of opting for no visit in the choice of no visit or a traditional visit. Higher private prices, in contrast, have the effect of increasing the probability of a private visit when the alternative is no visit.

None of the transport cost variables is significant; moreover, the drug cost variables that appeared to be of some importance in the adult model have very little explanatory power in the child model. In one instance private drug cost is significant, but the effect is very small and is in the direction of increasing the probability of a private visit (relative to no visit). The insurance dummy is insignificant in every case.

Time Costs

In the adult outpatient model, the transport time variables had little explanatory power, and the waiting time variables had unexpected signs. It seems logical to expect that these variables would have more importance in the child outpatient model, however, since children are likely to be accompanied by an adult who is not sick and probably has other things to do. In the adult model, on the other hand, the adults were the ones who were sick, and they may have considered the best use of their time to be a trip to a doctor, no matter how long it took.

True to our expectation, the choice of practitioner in the child outpatient model seems to be more sensitive to the transport time variables but not to the waiting time variables. In fact, the transport time variable works exactly as expected. In each of the nine cases where a sign could be predicted, longer transport times to a facility acted to deflect visits toward other facilities or towards the category of no visit. Two of these effects are statistically significant at above the 10 percent level, and they

both occur in the choice between public and private visits. For public visits, the longer it takes to get to a public facility, the higher is the probability that a private visit will be preferred. Transport time works in the opposite direction for private facilities, as would be expected. The longer it takes to get to a private facility the more likely a public facility is to be used.

Thus, while households are not sensitive to the cash cost of getting to private and public facilities or to the price of a visit, they are sensitive to the time it takes to get to those facilities when a child has to be taken in. This is in contrast to the adult model where the transport time variables tended not to have the expected signs and generally had much lower significance levels than did the cost variables.

The waiting time effects are similar in the two models, however. For both adults and children, waiting time acts in a direction opposite to the expectation in virtually every case. It is statistically significant in only one case in the child model, that of public versus private (where longer private waits cause a higher probability of private visits). For both models the results indicate that waiting time does not act as a price. It is likely that waiting time is related to quality and that people expect to wait longer for better care. Moreover, time spent waiting may be considered to be a leisure activity (people can talk, sew, read, etc.) in contrast to walking time, for example, which is not conducive to other activities.

Quality

The quality variables, which made a small contribution in the adult model, appear to have no effect in the child outpatient model. Again there are nine cases in which signs could be predicted. Seven of these have the

expected sign, but none is statistically significant.

Assets

The asset variable seems to have the expected signs. A higher value of assets increases both the probability of a private visit relative to a public visit and the probability of a private visit relative to no visit. Higher asset value seems to reduce the probability of using a traditional practitioner is every case, but this effect is never statistically significant (although it is close). The one odd result is that people of higher wealth seem to have a relatively strong preference for making no visit rather than using a public facility. The effect of assets, while significant in several cases, appears to be as small as it was in the adult outpatient model.

Demographic Variables

The unmistakable impression given by the age variable in the estimation for the whole sample of children is that the older the child, the more likely no visit will be made relative to both traditional and private visits. In contrast, there is a preference for public visits relative to no visit as children get older (although this result is significant at only the 20 percent level). These results indicate a preference for free or inexpensive care for older children when all other factors are controlled for.

The estimations presented in tables A-7, for preschoolers, and A-8, for school-age children, allow additional analysis of the age variable. First, the descriptive statistics in table A-5 indicate that a majority of the older children used no practitioner, whereas only 36 percent of the younger children fell into this category. The households of the older sick children were approximately twice as wealthy, on the average, as those of the younger

children, which makes all the more interesting the preference for inexpensive care for the older group. Referring to the estimations, for neither group do the price or cash cost variables have very much explanatory power. While there are some marginal differences in significance levels and signs for the two age groups, the preference for no practitioner for the older children cannot be explained by the economic variables.

Within the zero to five group, age is again a highly significant indicator of whether no visit will be preferred to any of the professional alternatives. The closer a child gets to age five, the lower is the likelihood that he will be taken to any practitioner when he is sick. The same effect is apparent in the 6-13 group (the older the children get the less likely they are to be taken to a doctor), but in this case the signs tend not to be statistically significant.

The sex of the child has no explanatory value for either age group. For the zero to five group, the mother's education has no statistically significant explanatory power. However, for the 6 to 13 age group, mother's education is significant in four out of the six cells in table A-8, and the signs are in favor of modern over traditional practitioners and modern over no practitioner for more educated mothers. Thus mothers, whether highly educated or not, appear predisposed to seek out care for their younger children, but uneducated mothers tend to be less likely to seek treatment for their older children. From table A-5, we note that the mean educational level of the mothers was about the same for both age groups; so less educated mothers were not necessarily less likely to report their older children as sick. They were just less likely to take them to a doctor or healer. This behavior may be attributable to the differences in the types of diseases the two age groups are susceptible to and less concern by less educated

mothers about the diseases of older children, or it simply may be caused by a diversion of resources to the younger children by less educated mothers.

As in the adult model, the seriousness of the illness has a highly significant effect in producing a preference for some practitioner (no matter what the type) over no practitioner. Since the effect of this variable is consistent for each group, it does not help to explain the preference of no visit for older children.

The stay home variable offers additional information, however. For the zero to five age group, whether the mother stays home is not a significant determinant of medical choice in any of the six cases. For the older children, however, when the mother stays home she is more likely to treat her child at home than to use a practitioner. This effect is consistent for all three practitioners relative to the choice of no visit, but it is not statistically significant for private practitioners. There are two ways to interpret these patterns. Possibly mothers unable to stay home with their children are more risk sensitive than mothers who are at home. Since the mother cannot be at home to observe the child, she may prefer to make a preemptive attack on the illness by taking the child to a doctor or healer. Or this situation may simply be an example of the substitution of market-produced goods (medical visits) for home-produced goods (no visit) by mothers with a higher value of time. Thus older children whose mothers are less educated are more likely to be treated at home unless the mother works away from home. Younger children will tend to be taken to a practitioner whether the mother stays home or not.

To summarize, the major age-related finding is the preference of no visits, or no practitioner, for older children. This behavior is apparently

attributable almost exclusively to differences in the roles played by education of the mother and the "stay home" variable for the two age groups.

Returning to the model for all children (table A-6), we note that the other demographic variables tend not to add much information about choice of practitioner. Sex of the child is never a statistically significant predictor. Neither is the urban variable, although it comes quite close in two instances (showing a preference by urban dwellers for public rather than private and public rather than no visit).

Seriousness of the illness is highly significant in the all-age children results, as it is for the separate age groups, in causing a preference for some kind of practitioner over no practitioner, and the choice of private over public. The education of the mother explains a preference for both private over no visit and private over traditional, but in general this variable appears not to be very important for the sample of all children. The stay home variable is not significant for the entire sample (although it was for older children).

Conclusions

The economic variables tend to be statistically insignificant for children just as they are for adults. Only the transport time variables have noticeable explanatory power in the child model; this is to be expected since the sick child and possibly other members of the family have to be transported to the doctor. Once again the demographic and gravity of illness variables appear to be the important determinants of behavior, especially for explaining the differences in behavior between the two age groups. There are indications, however, that mothers' value of time affects medical decisions for the older children.

PRENATAL VISIT MODEL

Variable definitions and sample statistics for the prenatal visit model appear in table A-9. The results of the tobit estimation appear in table A-10. While it is well known that traditional midwives usually offer prenatal care (see pp. 17-19), traditional visits could not be included in this model because the BMS 1978 questionnaire did not allow for this possibility. Consequently, the number of prenatal visits includes only those made to modern facilities. Of 571 pregnant or recently delivered women with no missing values on this variable, 55 percent had at least one modern prenatal visit and 45 percent had none. For those who had visits, 67 percent visited public facilities and 22 percent went to private facilities.

For the prenatal model the relevant prices the women faced were less obvious than for the outpatient models. The alternatives were to use public prices only, both public and private prices, or the price of the closest practitioner of either kind (the closest modern practitioner). Although the data should not be "beaten until they confess the true model" (under ideal circumstances the analyst should know the true model in advance), we did try all three specifications. The results for the model using the combination of public and private prices were by far the most logical and significant. This result is especially reasonable because both types of facilities were used by the women.

Generally speaking, the government clinics did not charge for prenatal visits, and the private facilities charged quite a bit. The other variables were not very different, on the average, for the two types of facilities.

Cash Price

The public price turned out to be a significant deterrent to getting prenatal care. As in the outpatient models, prices were charged only at hospitals and puericulture centers, and these were within the range of two to five pesos per visit. Women were apparently not willing to pay very much to get public prenatal care even in these cases where the quality of the care may have been quite high. There is also a negative sign on the private price variable, although the magnitude is much smaller and the significance level is only at about 20 percent. This small magnitude is all the more interesting because the average private visit price was 18 times the average public price. The coefficients on the transport cost variables do not have the expected signs and are not statistically significant. The health insurance variable also is not a significant predictor.

Time Costs

Public transport time is a highly significant deterrent to using prenatal care services, although the magnitude of the effect is quite small. Private transport time is also a deterrent factor although it is significant only at the 18 percent level. We once again witness the situation in which there is no sensitivity to the cost of a trip, only to the time involved. The waiting times, as in our other results, are not significant.

Assets

Higher asset value is conducive to more prenatal visits. The effect, while significant, is of an infinitesimal magnitude.

Demographic Variables

Urban residence is a statistically significant variable with a large effect on increasing the number of prenatal visits. The education of the mother is also significantly positive, but the magnitude of the effect is much smaller than for the urban variable. Whether the mother stays home or not does not seem to affect the number of visits made.

The age of the mother has a statistically significant positive effect, and the number of live children has a significantly negative effect. Older women would be expected to have more children and to be more accustomed to traditional birth methods. Yet these effects indicate that within a given age group, the mothers with more children at home (more time constraints) will tend not to use prenatal services, which seems logical. For a given number of children, however, older women will be the ones more likely to seek prenatal care. A possible explanation is that the health benefits to older women outweigh the desire to continue traditional behavior.[33]

Conclusions

This model worked quite well to explain the number of prenatal visits. The cash price and travel time variables acted to reduce the number of visits. A more significant and stronger effect for these variables would be expected for prenatal care than for outpatient care because the former is probably less necessary and a more optional type of service. The demographic variables worked as might be expected, with the presence of the number of living children variable isolating a somewhat unexpected but certainly logical positive sign for the mother's age.

DELIVERY MODEL

Table A-11 contains the variable definitions and sample statistics for the model explaining delivery choice. Because of the importance of home deliveries and the impossibility of classifying midwife-attended deliveries as either private or public, we chose to classify deliveries as either modern or traditional.

About 27 percent of the mothers had a modern home delivery (usually attended by a midwife), 65 percent had a traditional home delivery, and 8 percent had a modern clinic delivery (a quarter of these were attended by a midwife; so a clinic or hospital delivery did not guarantee care by a doctor). We decided that in the choice of type of delivery, the relevant prices would be those of the closest modern medical facility (whether public or private) and those of the closest traditional midwife. We hypothesized that women would not be likely to travel far when they are in labor and would not be inclined to pick a practitioner for a home delivery who was too distant to be summoned quickly. The choice of prices was also dictated by the form of the dependent variable (modern versus traditional). Prices are for home deliveries only; clinic delivery prices were available but would have complicated the analysis considerably without adding significantly to the ability to interpret the results. As the model is presented, evidence is given for how home delivery costs deflect demand to clinics, but not for how clinic costs deflect demand to home deliveries. It is likely that one is the mirror image of the other, however.

The variables are self-explanatory, but it should be noted that delivery services by public clinics tend not to be free, in contrast with public outpatient and prenatal care. Delivery services were not so universally

available as the other services, either. All of the 50 government clinics in the BMSS 1981 facility survey offered home delivery attendances, and 16 offered clinic delivery services. A third of the private doctors offered home delivery attandances, and a fourth of them offered clinic deliveries. All of the 41 private midwives surveyed offered home attendances; 3 also offered clinic attendances. The hospitals, both public and private, offered clinic deliveries almost exclusively. The average price for home deliveries from the closest public facility was 17.70 pesos, while it was 112.99 pesos for the closest private facility. The low mean cost for modern facilities in table A-11 reflects the greater proportion of public clinics relative to private practitioners in the sample of the closest modern practitioner offering home deliveries.

Cash Prices

For the delivery predictions, there are four cash price effects which should have predictable signs. Of these, two have the expected sign, but only one is statistically significant. The significant effect is this: the higher the price of a modern home delivery, the more likely the woman is to choose a clinic delivery over a modern home delivery. This may appear to be a trivial result, but it indicates that even in the practice of childbirth, which has usually been conceptualized exclusively as a social and a medical phenomenon, the cost of the service can affect where the woman decides to deliver. The prices of modern and traditional home attendances do not appear to affect the choice of modern or traditional home practitioner, although it is interesting to note that the mean price of traditional attendances is about 25 percent higher than the mean price for modern home births. Many women apparently prefer the more costly alternative.

Time Costs

The time it takes for the nearest practitioner to get to the woman's home (or for her to get to the practitioner) is expected to be an important determinant of who is chosen as the birth attendant. The signs are all as expected--the farther away each practitioner is, the less likely that practitioner is to be used. However, the coefficients on travel time to the nearest traditional midwife are not statistically significant. This is probably because travel time for the traditional midwives is almost negligible, on the average, relative to the time it takes for the modern practitioner to get to the woman's barangay. Not surprisingly, therefore, transport time for modern practitioners turns out to be a statistically significant deterrent to having a modern home birth (in the choice of modern versus traditional home birth).

Quality

It was not possible to construct a quality index for traditional birth attendants, but if the usual modern home attendant is a doctor, women are much more likely to choose a modern home delivery over a clinic delivery. This (plus the price effect) suggests that women may choose a modern home delivery over a clinic delivery only after carefully weighing the relative cost of the two options and the type of practitioner that would be involved at the clinic and at home. However, the type of modern practitioner attending home births is not a significant determinant of the choice between a modern or a traditional home delivery. This behavior may reflect a judgement that a midwife is a midwife, whether she is traditional or modern.

Assets

Assets are a statistically significant factor in only one of the pairs of choices. In the case of a modern clinic delivery versus a traditional home delivery, a higher level of assets results in a higher probability of a clinic delivery. As in the previous models, the effect is very small, however.

Demographic Variables

The mother's age does not seem to affect delivery choice even though the average age of the mothers in the sample is almost 31 years, and 25 percent of the mothers are over age 35. This is true even though the likelihood of complications begins to increase rapidly for women beyond their mid-thirties.

Urban residence does not affect the choice of a modern clinic birth versus a modern home birth, which is surprising; but it does increase the probability that women will choose a modern home birth over a traditional home birth. Urban residence also increases the probability that a clinic birth will be chosen over a traditional birth.

In all cases mother's education is an important behavior predictor. More highly educated women are more likely to choose a clinic birth over a modern home birth, a modern home birth over a traditional one, and a clinic birth over a traditional home birth. The strongest effect is with the choice involved in the last-mentioned combination.

The number of the mother's living children is included in this model for two reasons. First, it is commonly thought that childbirth in low income countries has a social insurance component. More living children means having children available to care for the parents in their old age.

Thus a large number of living children would reduce the marginal importance of the latest addition, and there would be less desire to use scarce resources to insure the safety of the current birth. Consequently, the cheapest alternative would be chosen, other things constant. The family bequest model (Leibowitz and Friedman, 1979) would make the same prediction for different reasons. The second point is that, as before, the number of living children can represent a measure of the constraints operating on the mother's time. If she has a large number of children, she might be more likely to stay home because she cannot afford the time to be absent from the home. Thus, women with more children would be more likely to choose home births. All of this theorizing appears to be for naught, however, since the number of living children variable has no explanatory power in this model; so neither proposition seems to hold.

Conclusions

The delivery model is reasonably useful in explaining delivery type and location. The cash price and the quality of a modern home birth have important effects in explaining whether a modern delivery is sought at home or at a clinic. Transport time to modern facilities affects the decision to seek a modern or a traditional home birth. The asset and demographic variables also appear to operate as expected.

WELL-BABY CARE

Variable definitions and sample statistics for the well-baby model appear in table A-13. Results for a probit estimation appear in table A-14.

It would have been preferable to estimate a model for choice of

practitioner for well-baby care, but it was not possible either to identify or classify the practitioner who had given care to the newborn. Exactly 192 of the mothers claimed to have had well-baby care; 77 percent of these had the well-baby visit at home. About 12 percent of the visits were at a public clinic or hospital, and the remaining 11 percent were at a private clinic or hospital. The 77 percent of the visits that had taken place at home could not be classified as to public, private, or traditional unless we made the assumption that the well-baby visit was made by the same type of practitioner as had delivered the baby. Cross-frequencies with immunization data and delivery location suggested that this approach of assuming the same source would be considerably flawed; so we settled for a yes/no type of variable representing whether or not the infant had received any well-baby care.

The second issue was which prices to use. A review of the data for the 1981 facility survey led to the surprising discovery that, while nearly all of the government clinics and hospitals provided well-baby services, only about two-thirds of the private hospitals and half of the private clinics offered well-baby care. Less than 1 percent of the hilots and only a third of the private midwives offered this follow-up service. As a consequence, it appeared that most of the women would depend on government facilities for well-baby care except possibly in urban areas. Therefore, only the prices of well-baby care from government sources appear in this model.

Cash Prices

Neither the cash price of a public well-baby visit nor the transport cost to the public facility is statistically significant, although the signs

indicate that they both reduce the probability of a visit, and the transport cost variable comes close to being significant (23 percent level). The insurance variable is not significant.

Time Prices

Transport time has the expected sign, but the waiting time variable has a positive effect on using well-baby services similar to that observed in the previously described models. In this case the waiting time variable is statistically significant, however. Reference to the data indicates that this result may be of some interest. First, some government clinics and hospitals reported longer waiting times for well-baby visits than for outpatient visits. An explanation may be that these clinics and hospitals direct well-baby visits to special clinics or practitioners. Second, two public clinics, which served several barangays, were dropped from the facility sample because they did not offer well-baby care. They were replaced with public hospitals which required a one-hour wait in instances where the clinic had claimed no waiting for outpatients. These differences show up in the longer mean waiting time and larger standard deviation for public well-baby visits (table A-13) relative to the mean and standard deviation table A-1 reports. Thus, the result on waiting time may have been caused by the higher quality of those clinics offering special services to mothers and the perceived higher quality of the hospitals that displaced the two clinics. While there can be other plausible explanations for the effect of waiting time on well-baby care use, this result certainly invites careful evaluation of clinic practices with respect to these services.

Assets

Added assets appear to have a negative impact on whether well-baby care is sought. If our facility sample is correct, and private practitioners tend not to offer this service, then wealthier women may be benefitting less from well-baby services than their poorer counterparts who use government clinics. However, it should be noted that the asset effect is small in magnitude.

Demographic Variables

Neither age of mother nor location of residence are significant predictors of use of well-baby care. Education of the mother has a highly significant, if small, effect in increasing the probability of well-baby visits. The number of living children is not statistically significant, nor is the sex of the baby. If the woman had a modern delivery, however, she is more likely to seek well-baby care than if the delivery had been traditional. If she does not work away from home, she is also more likely to make well-baby visits.

Conclusions

There are a number of interesting findings from the well-baby model. Waiting time is statistically significant and acts as a deterrent for the first time in the series of demand models we have analyzed, and assets act in a manner opposite to the expectation. Plausible explanations are offered for these two effects. The variables with the most impact on increasing the probability of well-baby visits are the dummy variable for a modern delivery and the dummy for whether the mother stays home.

INFANT IMMUNIZATIONS

Table A-15 gives variable definitions and sample statistics for the infant immunization model. The results for a probit model explaining the probability of getting the infant vaccinated appear in table A-16.

Of the 477 mothers to whom the immunization questions in the survey applied, only 26 (or 5.45 percent) of them responded affirmatively that their newborn had received any vaccinations. Some of the infants were of course too young to have been immunized (in the United States, the usual immunization program starts when the infant is two months old*); even so, 5.45 percent represents an extremely low level of coverage.

Cross-tabulations of the dependent variables indicate that there does not appear to be very much continuity of care during the birth process, and this may be a major reason that immunizations, as the final stage of obstetrical care, are not pursued. For example, only 120 (44 percent) of the women who had received prenatal supervision also claimed to have sought well-baby care. In contrast, 72 (35 percent) of the women who did not have prenatal care did seek well-baby care. These numbers suggest that the connection between prenatal visits and well-baby visits is almost random. Similarly, the connection between type of well-baby care and whether the child received immunizations, where a close relationship would be expected, does not show a pattern. Of the children receiving well-baby care from a public facility, about 12 percent received vaccinations. For private facilities, the figure was 15 percent, and for home visits, the percent

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* Personal communication, Department of Pediatrics, School of Medicine, University of North Carolina at Chapel Hill, October 15, 1982.

vaccinated was 7.

Looked at from the delivery angle, 89 percent of the children who were vaccinated were born at home (92 percent of all children were born at home), about 63 percent of the vaccinated children were delivered by a traditional attendant (65 percent of all children were delivered by a hilot), and 30 percent of the vaccinated children were delivered by a midwife (compared to 27 percent of all children). For the 8 percent of the infants born in a clinic or a hospital, for whom a 100 percent immunization record might be expected, only 2 (or 5 percent) were immunized. In the aggregate, of the 488 mothers who had a live birth, 329 (or 65 percent) of them had at least one contact with the modern medical system at some point during their pregnancy either through prenatal visits, the delivery, or well-baby visits. On the assumption that the data are correct, these figures show a very low level of effectiveness by the medical care system in transmitting to the mothers the importance of child immunizations.

In regard to the model for child immunizations, the relevent prices at public facilities were used. An even smaller number of the private facilities surveyed in 1981 offered this service, and half of the public hospitals were dropped from the sample because they did not offer immunizations.

Cash Prices

Neither transport cost nor immunization price were significant determinants of whether an immunization was sought for the newborn. The public price coefficient, however, is significant at the 11 percent level (just below the cutoff) but is positive in sign. This finding is important, and thus deserves some discussion, because the public clinics do not charge for

immunizations. Consequently, what we probably observe is that women are more likely to get their child immunized when they are serviced either by a hospital or by a puericulture center. This behavior might be explained by better outreach programs by those institutions, their perceived higher quality, or the obvious possibility that the women prefer to pay for immunizations. Insurance coverage has a statistically significant positive effect in this model, a finding consistent with the price findings.

Time Costs

Neither transport cost nor waiting time affects the probability, for our sample, of getting a child immunized.

Assets

The value of assets has a statistically insignificant (significant at the 17 percent level) negative impact on whether the child is immunized. This is consistent with the effect of assets on the probability of using well-baby services.

Demographic Variables

The age of the mother has a statistically significant positive effect on the probability of having the baby immunized. The magnitude of the effect is very small, but just as in the prenatal model, it is matched with a negative effect for the number of living children. The positive effect of age on use of both of these highly optional services, when home time constraints are controlled for, suggests that older women may not necessarily prefer traditional to modern practices, as is usually expected. It may simply be more costly in terms of time for older mothers to use modern services.

Residence, the stay at home variable, sex of the child, and type of delivery have no significant effect on the probability of getting the baby immunized. Education has a positive effect, but is significant only at the 11 percent level, just below our chosen threshold.

Conclusions

The economic variables perform poorly in explaining the probability that a baby will be immunized. If anything, higher costs predict a higher probability of getting an immunization (even though the sign on assets is negative). Insurance coverage for the first time in these analyses has a significant positive effect on the probability of seeking the service. Of the demographic variables, only the age of the mother and number of living children help to explain the probability of an immunization.

GENERAL CONCLUSION

The results for each model suggest similarities and differences in the effects of the independent variables for the various types of service analyzed. In this section, we highlight these points, compare the results, and relate the lessons from the case study to the general issues outlined in chapter 1.

As an aid in this effort, a number of summary tables are included in the appendix. Table A-17 presents, for each of the six models and for each type of facility, the change in the probability of using each facility or service that would be caused by a 10 percent increase, above its mean, in the value of each continuous variable. (Each dummy variable was changed from its mean to zero or one, as was appropriate to its definition.)[34]

Tables A-18 through A-21 provide simple cross-tabulations of visit types by asset class. We used two asset classes, a high and a low class, representing the top and bottom 40 percent (respectively) of the distribution of the value of household assets for each sample.[35]

Cash Prices and Time Costs

In chapter 1, we observed that the general approach of governments is to supply rural health services at little or no cost to the patients. This is the case in the Philippines, where the rural health clinics in our 1981 survey charged for no services except for home deliveries and occasionally some drugs. We suggested in previous chapters that transport time, waiting time, and transport cost were other economic factors that would be expected to have some weight in utilization decisions, and thus in governmental planning decisions as well.

We can make three types of observations concerning our results on these variables. First, the costs involved in using medical facilities are not trivial for any of the models we estimated, despite governmental efforts to reduce costs. Traditional and public cash prices tend to be low except for deliveries, but private facilities charge, on the average, 5 times the traditional price and 20 times the public price. The transport and time costs of using traditional practitioners are negligible, but public and private facilities are, on the average, about 25 minutes away from the survey barangays. The mean values for transport time have large standard deviations, however, which indicates that many patients travel far longer than 25 minutes to reach care. Facility-reported waiting times are low, but, as indicated earlier, patient-reported waiting times are quite high. These descriptive statistics suggest that a trip to a doctor may for many patients easily

involve an entire day or even more time, unless the patient desires to use a traditional healer.

The second point is that as large as the transport time and cash costs may often be, they do not prove very useful in most cases for explaining where patients seek care. Only in the case of traditional healers do patients show any sensitivity to cash costs, and the degree there is small. Even if the public and private cost variables were statistically significant, which they are not except for prenatal and delivery care, table A-17 demonstrates that their effects for any of the six services would be almost nil.

The third point is that longer waiting time, if anything, is positively related to the probability of making almost any kind of visit. Heller (1976) found similar results for his Malaysian study; he and Sheila Cosminsky* consider that this preference for longer waits may be caused by the desirability of socializing at the clinic or the pleasantness of the physical surroundings there. Although we attempted to control for quality, there is the gnawing suspicion that the appeal of longer waits may also be related to people's expecting to wait longer for better care.

At any rate, the lack of strong results for the time cost, transportation cost, drug cost, and visit price variables indicates that in many, if not most, cases they are virtually irrelevant to the decision to seek a particular kind of care. In particular, adult and child outpatient visit decisions are apparently not made by first looking at relative costs and then deciding what to choose. Rather, the decision process appears to be one in which the choice of practitioner is made first, then the means are found to finance the decision. Cash costs seemed only to affect the choice between clinic and home deliveries

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*Personal communication, April 20, 1982.

(which is probably outside the choice set of most of the women in rural low income areas) and the choice of the number of prenatal visits to make. Table A-17 shows how small is the magnitude of these effects, however.

These results are directly applicable to financing questions. Our evidence indicates that the threshold may be quite high at which prices even begin to enter the medical care decision process. In relative terms, for example, private doctors in our study are extraordinarily expensive, yet their prices are never statistically significant predictors of choices, and the price effects table A-17 reports are small enough to be safely ignored. There appears to be considerable room for attempting partial or full financing of outpatient facilities on the basis of user fees. There are ethical questions and problems of public policy involved in pursuing such a scheme, but it certainly appears to be a feasible route to take.

Income

In this section we will assume that our asset measure gives roughly the same results in our estimations that an actual income variable might give. Except in the well-baby and immunization models, assets have the expected effects of increasing the probability of using private practitioners for outpatient visits, increasing the probability of modern deliveries, and increasing the number of prenatal visits. In all cases the asset effect is very small, however. This small magnitude is demonstrated by the results table A-17 reports.

The policy question relevant to income effects is whether providing free public clinics improves the medical care of rural indigents. Our estimations and reference to the frequencies in tables A-18 through A-21 give a few insights into the behavioral aspects of this issue.

As we noted in chapter 1, placing clinics in poor rural areas does not assure service to the rural poor unless they are inclined to use the clinics. As we discussed earlier, adult outpatients in our sample who consider themselves seriously ill tend to be (on the average) almost half as wealthy as those who claim not to be seriously ill. Moreover, the seriously ill sample does not appear to be sensitive to economic costs, and the assets owned are not significant determinants of their behavior. Reference to table A-17 indicates that changing the dummy for a serious illness from its mean value to a value of one increases the probability of a private visit by 73 percent for either adults or children. This line of reasoning suggests that the poorest groups in our sample did not report themselves ill unless they felt they were seriously ill, and since they were seriously ill they were much more likely to seek care from a costly private source than from a government clinic. The cross-tabulations in tables A-18 through A-21 tend to confirm this hypothesis, but add no new information.

Thus, while public clinics are definitely reaching some poor clients, the consumption patterns of the poorer outpatient group clearly indicates a preference for private practitioners as well as very little sensitivity to costs. The results for the other services tend to reinforce this picture of low use of government clinics by the poorer asset group; this pattern is explained below.

Table A-18 demonstrates that the prenatal services provided by government clinics reach the highest asset group in almost twice the proportions they reach the lower asset class. Table A-19 shows that this is probably because only 34 percent of the poorer class sought any prenatal care, as opposed to 65 percent of the richer group.

For the delivery model, table A-18 shows that the composition of the

clientele for traditional deliveries is weighted in favor of the lower asset group, whereas modern services are used in higher proportions by the richer women. About 74 percent of clinic deliveries, in fact, are accounted for by the wealthier group. Additional evidence from table A-19 shows that only 28 percent of the poorer class chose a modern delivery, as opposed to 45 percent of the richer group. According to the mean prices table A-11 reports, the preference of the poorer group for higher priced traditional deliveries may actually lead to the result that poorer women pay more on the average for their deliveries than do the richer women, who are more likely to use free or low-priced modern public services. This hypothesis cannot be confirmed using our data, but it is a very likely possibility. At any rate, the government-subsidized delivery services clearly reach the wealthier women in greater proportion than they reach the poorer women.

Despite the negative coefficients on the asset variable in the well-baby and immunization models, the frequencies show that in the absence of controls for other variables, these services also reach the wealthier 40 percent of the sample in larger proportions than they reach the poorer class. The estimations for these two models indicate, however, that the government clinics have had the most success in these two service areas in neutralizing the wealth variable as a predictor of whether the services will be used.

Nevertheless, one of the major lessons to be drawn from these models is that the poorer 40 percent of the samples are in most cases not being reached by the government clinics in the proportions that might be expected. If, for instance, the poorer households were using government services in the proportions planned, then the lower 40 percent of our samples would account for, say, 60 percent and more of the patient load for each service listed in table A-18. The actual proportions never exceed 44 percent, as

indicated in that table, and, in every other case except the one showing 44 percent, the poorer group is actually represented at government clinics in proportions smaller than their presence in the samples as a whole.

This bleak picture is somewhat ameliorated by the results for well-baby and immunization services. In these cases, the government clinics have apparently added new services which, according to our facility survey, had been extremely inaccessible previous to the governmental presence.

The lesson may be that if government facilities want to serve the rural poor, they should charge sliding fee scales for their clinic services, and use the proceeds to finance outreach efforts with the goals of extending services to the rural poor directly, improving the quality of care they are already getting from traditional sources, and improving the coverage of preventive services such as immunizations. Clearly when people are seriously ill, they will seek medical help from some source or another. They will be willing to pay and possibly even desirous of paying for that care.

Thus the greatest potential effect of free government services may not lie with those cases where necessity precipitates action. Governments can certainly play a major role in assuring that transportation facilities are available to give these sick people access to care, and that existing sources of outpatient care are of reasonable quality. However, direct governmental health care efforts may be better directed toward aggressively distributing prenatal, delivery, well-child, and preventive services, where the payoff for competent care can be quite high, but, where patients view the care itself as being more optional than outpatient care.

The above are some of the ideas prompted by the results of our modeling and estimations. They indicate the breadth of available policy options and the desirability of more experimentation with governmental efforts to reach

the poor.

Knowledge and Other Factors

In chapter 1 we made the claim that our approach would allow testing the effects of demographic, educational, and other personal characteristics in a fully specified model which would isolate the effects of these variables. In every model we tested, these types of variables were strongly significant in explaining health care decisions.

The age of the individual, which might be taken as a measure of the natural deterioration of health and also as a measure of an individual's traditional orientation, had a consistent effect of increasing the probability of using all types of care. The only exception was in the child outpatient model, where older children tended to be treated at home. Perhaps the most surprising age effect was the preference of older women for more pre-natal care, for modern deliveries, and for child immunizations. These effects were probably only isolated because we were able to control for home time constraints, which tend to be greater for older women with more children. Apparently, older women are not any more traditionally oriented than are younger ones, and may be even more modern in outlook.

The sex variable was a significant determinant of adult outpatient practitioner choice, with men preferring private practitioners to public clinics. This may be a case of the diversion of household resources towards higher quality care for men. There was no significant effect for sex in any of the other models.

As explained in chapter 3, there is no clear idea of exactly what is measured by the urban variable when so many other effects that can be associated with urban residence (greater supply of services, higher income,

etc.) are already directly controlled for in the models. It may represent the migrant personality of urban dwellers, a greater market orientation for urban households, more modern urban behavior, or some other urban characteristic. Irrespective of what the variable actually captures, urban residence is not statistically significant in the adult outpatient model, but it comes very close to significance in the child outpatient model, where there is a preference by urbanites for public relative to private care for their sick children. Table A-17 shows that this effect is quite strong. Urban residence was also a strong predictor of the use of modern delivery and of more prenatal visits, although it does not seem to make a difference for the choice of well-baby or immunization services.

Education had a consistently significant effect in the models, predicting a preference in all cases for modern over traditional care, a higher probability of well-baby visits, and a larger number of prenatal visits. Table A-17 demonstrates, however, that the magnitude of the effect of education is not large except in the case of deliveries.

Finally, the dummy variable indicating that the household has health insurance is only significant in the immunization model, where it has a strong effect in predicting that a baby will be immunized.

These models offer a considerable amount of information on the determinants of medical care consumption behavior for our Filipino sample. Perhaps the most important and most general lessons for health planners are the attention that should be paid to quality as opposed to cost in planning health services, and the important distinction that should be made in designing "necessary" services such as outpatient clinics as opposed to other, more optional forms of care.

APPENDIX: TABLES OF ESTIMATION RESULTS FOR MODELS

TABLE A-1. Variable Definitions and Sample Statistics for Adult Outpatient Models

	ALL ADULTS (N=401)		SERIOUS ILLNESS (N=104)		NONSERIOUS ILLNESS (N=297)	
A. DEPENDENT VARIABLE	No.	(%)	No.	(%)	No.	(%)
Traditional Visit	57	(14)	16	(15)	41	(14)
Public Visit	63	(16)	19	(18)	44	(15)
Private Visit	117	(29)	46	(44)	71	(24)
No Visit	164	(41)	23	(22)	141	(47)
B. INDEPENDENT VARIABLES	MEAN	S.D.*	MEAN	S.D.*	MEAN	S.D.*
Traditional Cash Price (Pesos)	2.1	2.0	2.3	2.0	2.1	2.0
Public Cash Price (Pesos)	0.3	0.9	0.2	0.7	0.3	1.0
Private Cash Price (Pesos)	11.0	8.9	11.8	9.0	10.7	8.8
Traditional Transport Cost (Pesos)	0.1	0.4	0.1	0.5	0.1	0.4
Public Transport Cost (Pesos)	1.7	4.6	2.7	7.1	1.3	3.3
Private Transport Cost (Pesos)	1.1	1.4	1.2	1.7	1.0	1.3
Traditional Transport Time (Min.)	5.4	10.9	4.6	9.2	5.7	11.4
Public Transport Time (Min.)	24.0	33.8	24.2	35.2	23.9	33.3
Private Transport Time (Min.)	24.6	31.7	27.9	37.2	23.4	29.6
Traditional Wait Time (Min.)	3.4	15.1	2.4	12.3	3.8	16.0
Public Wait Time (Min.)	4.2	6.9	4.4	6.9	4.2	6.9
Private Wait Time (Min.)	4.5	8.4	4.9	8.8	4.3	8.3
Usually Examined by Doctor - Public (0=No, 1=Yes)	0.6	0.5	0.5	0.5	0.6	0.5
Usually Examined by Doctor - Private (0=No, 1=Yes)	0.8	0.4	0.8	0.4	0.8	0.4
Traditional Practitioner Does Not Treat Any of 5 Common Illnesses (0=Does Treat, 1=Does Not)	0.2	0.4	0.2	0.4	0.2	0.4
Traditional Drug Cost (Pesos)	0.2	0.7	0.2	0.8	0.2	0.7
Public Drug Cost (Pesos)	18.1	43.8	17.9	43.4	18.2	44.0
Private Drug Cost (Pesos)	179.6	227.9	122.7	123.0	199.5	251.8
Sick Person Insured (0=No, 1=Yes)	0.1	0.3	0.1	0.3	0.1	0.3
Present Value of Household Assets	5197.8	12540.1	3412.6	5691.8	5822.9	14132.3
Age of Sick Person (Years)	40.3	17.5	40.3	17.0	40.3	17.7
Sex of Sick Person (0=Female, 1=Male)	0.5	0.5	0.6	0.5	0.5	0.5
Residence is Urban (0=Rural, 1=Urban or Poblacion)	0.2	0.4	0.2	0.4	0.2	0.4
Education of Sick Person (Years of School Completed)	6.6	3.6	6.5	3.2	6.7	3.8
Illness is Serious (0=Not Serious, 1=Serious)	0.3	0.4				

*S.D. = Standard Deviation

TABLE A-2. Conditional Logit Results for Adult Outpatients (N=40)--Estimated Coefficients (Asymptotic t-values in parentheses)

DEPENDENT VARIABLES (LN) / INDEPENDENT VARIABLES	P(PUBLIC)/P(TRAD.)	P(PRIVATE)/P(TRAD.)	P(NO VISIT)/P(TRAD.)	P(PRIVATE)/P(PUBLIC)	P(NO VISIT)/P(PUBLIC)	P(NO VISIT)/P(PRIVATE)
Constant	2.501 (1.908)	1.584 (1.296)	3.389 (2.830)	-.917 (-1.011)	.838 (.981)	1.755 (2.386)
Traditional Cash Price	. (1.086)	.188 (1.130)	.223 (1.408)	-.008 (-.604)	.028 (.228)	.036 (.358)
Public Cash Price	.588 ** (2.267)	.422* (1.659)	.452** (2.058)	-.166 (-.736)	-.136 (-.720)	.030 (.164)
Private Cash Price	-.003 (-.094)	-.021 (-.684)	-.021 (-.701)	-.018 (-.626)	-.018 (-.638)	.00006 (.003)
Traditional Transport Cost	.570 (.699)	.371 (.447)	.365 (.469)	-.199 (-.367)	-.205 (-.522)	-.006 (-.012)
Public Transport Cost	-.299 (-1.133)	-.068 (-1.354)	-.041 (-.910)	.230 (.877)	.258 (.985)	.028 (.632)
Private Transport Cost	-.49 (-1.398)	-.280 (-1.136)	-.346 (-1.517)	.210 (.640)	.144 (.452)	-.066 (-.325)
Traditional Transport Time	-.014 (-.566)	-.043 (-1.591)	-.017 (-.743)	-.029 (-1.300)	-.003 (-.185)	.026 (1.300)
Public Transport Time	.015 (1.016)	.003 (.260)	.007 (.615)	-.012 (-1.076)	-.008 (-.778)	.004 (.569)
Private Transport Time	.0001 (.009)	-.002 (-.124)	-.003 (-.205)	-.002 (-.137)	-.003 (-.224)	-.001 .088)
Traditional Wait Time	-.001 (-.089)	.011 (.890)	-.003 (-.224)	.012 (1.087)	-.002 (-.135)	-.014 (-1.471)
Public Wait Time	.020 (.517)	-.024 (-.642)	.034 (1.030)	-.045 (-1.366)	.014 (.477)	.058** (2.168)
Private Wait Time	-.043 (-1.254)	-.015 (-.513)	-.050* (-1.784)	.028 (.917)	-.007 (-.245)	-.035 (-1.476)
Usually Examined by Doctor-Public	.044 (.084)	.558 (1.219)	.549 (1.224)	.514 (1.254)	.505 (1.281)	-.009 (-.029)
Usually Examined by Doctor-Private	-1.534 (-1.490)	-1.364 (-1.405)	-.807 (-.848)	.170 (.267)	.727 (1.204)	.557 (1.106)
Trad Practitioner Not Treat 5 Ills	.644 (.924)	.722 (1.184)	1.165** (1.990)	.078 (.145)	.522 (1.024)	.444 (1.114)
Traditional Drug Cost	.578 (1.309)	.395 (1.005)	.442 (1.143)	-.183 (-.590)	-.136 (-.445)	.047 (.201)
Public Drug Cost	-.017*** (-2.821)	-.022*** (-3.444)	-.015*** (-3.169)	-.005 (-.768)	.002 (.383)	.007 (1.279)
Private Drug Cost	-.003* (-1.890)	.00008 (.084)	-.001 (-1.474)	.003** (2.077)	.001 (1.037)	-.001* (-1.951)
Sick Person Insured	9.425 (.119)	9.999 (.126)	10.293 (.130)	.574 (.900)	.868 (1.432)	.294 (.665)
Present Value of Household Assets	.00008 (1.335)	.0001* (1.912)	.00009 (1.638)	.00003 (1.352)	.00001 (.630)	-.00002 (-1.393)
Age of Patient	-.006 (-.443)	.001 (.100)	-.023* (-1.869)	.008 (.672)	-.017 (-1.489)	-.024*** (-2.677)
Sex (0=Female, 1=Male)	.539 (-1.258)	.251 (.665)	.234 (.658)	.790** (2.236)	.773** (2.310)	-.017 (-.062)
Urban (0=Rural, 1=Urban)	-.294 (-.432)	.392 (.678)	.252 (.445)	.686 (1.289)	.546 (1.047)	-.140 (-.364)
Education of Sick Person	-.015 (-.202)	-.029 (-.423)	-.113* (-1.701)	-.014 (-.229)	-.097* (-1.701)	-.084* (-1.739)
Illness is Serious	.343 (.715)	.888** (2.085)	-.801* (-1.843)	.545 (1.443)	-1.144*** (-2.904)	-1.689*** (-5.078)

*significant at 90% level ($|t| > 1.645$)
**significant at 95% level ($|t| > 1.960$)
***significant at 99% level ($|t| > 2.576$)

TABLE A-3. Conditional Logit Results for Seriously Ill Adult Outpatients (N=104)--
Estimated Coefficients (Asymtotic t-values in parentheses)

DEPENDENT VARIABLES (LN) / INDEPENDENT VARIABLES	P(PUBLIC)/P(TRAD.)	P(PRIVATE)/P(TRAD.)	P(NO VISIT)/P(TRAD.)	P(PRIVATE)/P(PUBLIC)	P(NO VISIT)/P(PUBLIC)	P(NO VISIT)/P(PRIVATE)
Constant	3.801 (1.374)	2.015 (.872)	.451 (.164)	-1.790 (-.813)	-3.350 (-1.266)	-1.564 (-.733)
Traditional Cash Price	.077 (.122)	.539 (.952)	.490 (.773)	.462 (.990)	.414 (.830)	(-.049) (-.132)
Public Cash Price	-.980 (-.822)	.088 (.086)	-.461 (-.407)	1.068 (.912)	.519 (.433)	-.549 (-.747)
Private Cash Price	.078 (.725)	.006 (.078)	-.063 (-.639)	-.072 (-.829)	-.140* (-1.348)	-.069 (-.930)
Traditional Transport Cost	20.556 (.099)	13.607 (.066)	15.702 (.076)	-6.95** (-2.014)	-4.854** (-1.728)	2.095 (.836)
Public Transport Cost	-1.039* (-1.489)	-.116 (-.809)	-.130 (-.826)	.924* (1.342)	.909 (1.311)	-.015 (-.130)
Private Transport Cost	.358 (.468)	.385 (.591)	-.206 (-.177)	.026 (.036)	-.564 (-.456)	-.590 (-.554)
Traditional Transport Time	.067 (.264)	.328** (1.711)	.432 (2.134)**	.261 (1.227)	.365* (1.690)	.104* (1.334)
Public Transport Time	0.68 (1.126)	-.035 (-.857)	.021 (.468)	-.104** (-1.907)	-.048 (-.809)	.056** (1.766)
Private Transport Time	-.050 (-.974)	-.054 (-1.182)	-.067 (-1.281)	-.004 (-.097)	-.017 (-.353)	-.013 (-.381)
Traditional Wait Time	.011 (.019)	.472 (.891)	.439 (.827)	.462* (1.499)	.428* (1.385)	-.034 (-.853)
Public Wait Time	.224* (1.32)	.081 (.512)	.307** (1.781)	-.143* (-1.514)	.083 (.802)	.226*** (2.555)
Private Wait Time	-.054 (-.491)	.067 (.706)	.039 (.382)	.121* (1.573)	.093 (1.137)	-.028 (-.511)
Usually Examined by Doctor-Public	-.195 (-.128)	.194 (.194)	.015 (.012)	.390 (.305)	.209 (.155)	-.180 (-.192)
Usually Examined by Doctor-Private	-2.44 (-1.02)	.345 (.176)	1.593 (.658)	2.786* (1.473)	4.034** (1.840)	1.248 (.743)
Trad Practitioner Not Treat 5 Ills	.218 (.098)	-.460 (-.295)	-1.380 (-.735)	-.678 (-.358)	-1.598 (-.795)	-.920 (-.798)
Traditional Drug Cost	.845 (.455)	.437 (.294)	.993 (.631)	-.408 (-.334)	.148 (.114)	.556 (.836)
Public Drug Cost	.052 (1.149)	.003 (.089)	.028 (.759)	-.049* (-1.389)	-.024 (-.692)	.025 (1.217)
Private Drug Cost	-.004 (-.487)	-.00003 (-.004)	.0004 (.049)	.004 (.627)	.005 (.614)	.0004 (.094)
Sick Person Insured	12.94 (.065)	11.309 (.567)	13.096 (.066)	-1.636 (-1.004)	.152 (.088)	1.787* (1.500)
Present Value of Household Assets	.00002 (.154)	-.00003 (-.247)	-.00005 (-.400)	-.00005 (-.466)	-.00008 (-.565)	-.00003 (-.275)
Age of Patient	-.036 (-1.07)	-.017 (-.570)	-.043 (-1.239)	.019 (.681)	-.007 (-.220)	-.026 (-1.001)
Sex (0=Female, 1=Male)	-.210 (-.171)	.539 (.566)	-.868 (-.770)	.749 (.716)	-.658 (-.542)	-1.407* (-1.524)
Urban (0=Rural, 1=Urban)	-19.874 (-.023)	-1.695 (-1.132)	-1.638 (-.810)	18.179 (.021)	18.236 (.021)	.057 (.039)
Education o Sick Person	-.175 (-.959)	-.200* (-1.383)	-.116 (-.740)	-.024 (-.163)	.060 (.364)	.084 (.641)

*significant at 90% level ($|t| > 1.315$)
**significant at 95% level ($|t| > 1.706$)
***significant at 99% level ($|t| > 2.479$)

TABLE A-4. Conditional Logit Results for Nonseriously Ill Adult Outpatients (N=297)--
Estimated Coefficients (Asymptotic t-values in parentheses)

DEPENDENT VARIABLES (LN) / INDEPENDENT VARIABLES	P(PUBLIC)/P(TRAD.)	P(PRIVATE)/P(TRAD.)	P(NO VISIT)/P(TRAD.)	P(PRIVATE)/P(PUBLIC)	P(NO VISIT)/P(PUBLIC)	P(NO VISIT)/P(PRIVATE
Constant	12.373 (.098)	11.269 (.089)	13.563 (.107)	-1.104 (-.998)	1.191 (1.205)	2.295 (2.729)
Traditional Cash Price	.190 (.859)	.186 (.894)	.222 (1.143)	-.005 (-.029)	.032 (.231)	.037 (.320)
Public Cash Price	.725** (2.376)	.360 (1.163)	.439* (1.710)	-.365 (-1.326)	-.287 (-1.357)	.079 (.352)
Private Cash Price	.008 (.191)	-.031 (-.743)	-.023 (-.608)	-.039 (-1.110)	-.032 (-1.010)	.008 (.279)
Traditional Transport Cost	.155 (.172)	.472 (.523)	.091 (.108)	.316 (.539)	-.064 (-.137)	-.380 (-.727)
Public Transport Cost	-.095 (-.473)	-.066 (-.788)	-.057 (-.830)	.029 (.145)	.038 (.194)	.009 (.133)
Private Transport Cost	-.843* (-1.680)	-.087 (-.265)	-.277 (-.951)	.756 (1.600)	.566 (1.267)	-.190 (-.789)
Traditional Transport Time	-.004 (-.140)	-.047 (-1.421)	-.023 (-.851)	-.043 (-1.602)	-.019 (-1.020)	.024 (.994)
Public Transport Time	.007 (.432)	.003 (.199)	.004 (.260)	-.004 (-.437)	-.003 (-.379)	.0008 (.121)
Private Transport Time	.011 (.542)	.002 (.130)	.004 (.229)	-.009 (-.518)	-.007 (-.487)	.001 (.117)
Traditional Wait Time	.002 (.111)	.009 (.698)	-.005 (-.345)	.008 (.629)	-.006 (-.513)	-.014 (-1.354)
Public Wait Time	.016 (.341)	-.027 (-.587)	.015 (.399)	-.043 (-1.049)	-.001 (-.032)	.042 (1.328)
Private Wait Time	-.041 (-.939)	-.031 (-.789)	-.061* (-1.771)	.010 (.263)	-.020 (-.586)	-.031 (-1.04)
Usually Examined by Doctor-Public	.012 (.018)	.432 (.728)	.326 (.582)	.420 (.821)	.314 (.677)	-.107 (-.287)
Usually Examined by Doctor-Private	-11.897 (-.094)	-12.105 (-.096)	-11.327 (-.090)	-.208 (-.275)	.571 (.848)	.779 (1.314)
Trad Practitioner Not Treat 5 Ills	.926 (1.077)	.706 (.891)	1.340* (1.829)	-.220 (-.340)	.413 (.717)	.633 (1.308
Traditional Drug Cost	.367 (.736)	.128 (.276)	.225 (.520)	-.239 (-.639)	-.143 (-.422)	.096 (.336)
Public Drug Cost	-.024*** (-2.726)	-.023** (-2.531)	-.015*** (-2.679)	.0008 (.078)	.008 (1.112)	.008 (.996)
Private Drug Cost	-.003* (-1.936)	.00008 (.078)	-.001 (-1.539)	.003** (2.119)	.001 (1.053)	-.002** (-1.994)
Sick Person Insured	9.710 (.096)	10.432 (.092)	10.470 (.092)	.722 (.941)	.760 (1.074)	.038 (.075)
Present Value of Household Assets	.0001 (1.336)	.0002* (1.880)	.0002* (1.722)	.00005* (1.700)	.00005 (1.183)	-.00001 (-1.253)
Age of Patient	-.005 (-.289)	.012 (.724)	-1.828 (-1.223)	.017 (1.164)	-.013 (-.973)	-.030*** (-2.807)
Sex (0=Female, 1=Male)	-.734 (-1.352)	.027 (.576)	.405 (.933)	1.008** (2.248)	1.139*** (2.813)	.131 (.410)
Urban (0=Rural, 1=Urban)	.648 (.758)	.417 (.536)	.290 (.391)	-.231 (-.361)	-.363 (-.630)	-.132 (-.278)
Education of Sick Person	.024 (.248)	.037 (.418)	-.094 (-1.119)	.013 (.181)	-.118* (-1.763)	-.132** (-2.354)

*significant at 90% level (|t| > 1.645)
**significant at 95% level (|t| > 1.960)
***significant at 99% level (|t| > 2.576)

TABLE A-5. Variable Definitions and Sample Statistics for Child Outpatient Models

	ALL CHILDREN (N=556)		CHILDREN 0-5 (N=341)		CHILDREN 6-13 (N=215)	
A. DEPENDENT VARIABLE	No.	(%)	No.	(%)	No.	(%)
Traditional Visit	62	(11)	43	(13)	19	(9)
Public Visit	89	(16)	60	(17)	29	(13)
Private Visit	174	(31)	116	(34)	58	(27)
No Visit	231	(42)	122	(36)	109	(51)
B. INDEPENDENT VARIABLES	MEAN	S.D.*	MEAN	S.D.*	MEAN	S.D.*
Traditional Cash Price (Pesos)	1.8	1.5	1.8	1.5	1.7	1.6
Public Cash Price (Pesos)	0.4	1.2	0.4	1.2	0.3	1.0
Private Cash Price (Pesos)	12.5	7.2	12.7	7.2	12.1	7.0
Traditional Transport Cost (Pesos)	0.1	0.5	0.1	0.4	0.1	0.5
Public Transport Cost (Pesos)	1.1	2.0	1.2	2.4	0.9	1.1
Private Transport Cost (Pesos)	1.2	1.3	1.3	1.5	1.0	1.0
Traditional Transport Time (Min.)	7.5	23.6	6.9	20.9	8.5	27.2
Public Transport Time (Min.)	25.0	39.0	26.6	38.9	22.5	39.1
Private Transport Time (Min.)	26.3	38.8	28.1	39.1	23.5	38.2
Traditional Wait Time (Min.)	4.2	18.0	3.3	14.9	5.6	22.0
Public Wait Time (Min.)	3.5	6.1	2.9	5.4	4.3	7.0
Private Wait Time (Min.)	3.3	7.3	3.4	7.6	3.1	6.7
Usually Examined by Doctor - Public (0=No, 1=Yes)	0.5	0.5	0.5	0.5	0.5	0.5
Usually Examined by Doctor - Private (0=No, 1=Yes)	1.0	0.1	1.0	0.1	1.0	0.1
Traditional Practitioner Does Not Treat Any of 5 Common Illnesses (0=Does Treat, 1=Does Not)	0.1	0.3	0.1	0.4	0.1	0.3
Traditional Drug Cost (Pesos)	0.4	1.4	0.4	1.6	0.3	1.2
Public Drug Cost (Pesos)	22.7	49.2	25.1	52.9	18.8	42.7
Private Drug Cost (Pesos)	273.6	282.7	278.0	284.8	266.6	280.0
Sick Child Insured (0=No, 1=Yes)	0.1	0.3	0.1	0.3	0.1	0.3
Present Value of Household Assets	4240.2	12111.2	3006.1	7686.6	6197.5	16741.1
Age of Child (Years)	5.0	3.7	2.4	1.3	9.1	2.2
Sex of Child (0=Female, 1=Male)	0.5	0.5	0.5	0.5	0.5	0.5
Residence is Urban (0=Rural, 1=Urban or Poblacion)	0.2	0.4	0.2	0.4	0.2	0.4
Education of Mother (Years of School Completed)	7.3	3.3	7.4	3.1	7.1	3.5
Illness is Serious (0=Not Serious, 1=Serious)	0.2	0.4	0.2	0.4	0.2	0.4
Mother Either Works at Home or Does Not Work (0=Away, 1=Home)	0.8	0.4	0.8	0.4	0.7	0.4

*S.D. = Standard Deviation

TABLE A-6. Conditional Logit Results for Child Outpatients, Ages 0-13 (N=566)--Estimated Coefficients (Asymptotic t-values in parentheses)

DEPENDENT VARIABLES (LN) / INDEPENDENT VARIABLES	P(PUBLIC) / P(TRAD.)	P(PRIVATE) / P(TRAD.)	P(NO VISIT) / P(TRAD.)	P(PRIVATE) / P(PUBLIC)	P(NO VISIT) / P(PUBLIC)	P(NO VISIT) / P(PRIVATE
Constant	-8.497 (-.177)	-.800 (-.489)	-.108 (-.106)	7.696 (.160)	-2.295 .020)	-9.99 (-.098)
Traditional Cash Price	.078 (.496)	.147 (1.036)	.357*** (2.635)	.069 (.612)	.280*** (2.652)	.210** (2.565)
Public Cash Price	-.195 (-1.206)	-.265* (-1.671)	-.045 (-.323)	-.070 (-.502)	.150 (1.187)	.220* (1.796)
Private Cash Price	-.022 (-.653)	.007 (.235)	-.037 (-1.231	.029 (1.114)	-.015 (-.609)	-.044** (-2.001)
Traditional Transport Cost	.659 (.655)	.016 (.019)	.038 (.045)	-.643 (-.922)	-.621 (-.898)	.022 (.052)
Public Transport Cost	.039 (.230)	-.047 (-.240)	.051 (.356)	-.086 (-.492)	.012 (.111)	.098 (.644)
Private Transport Cost	-.031 (-.102)	-.023 (-.077)	.159 (.632)	.009 (.033)	.191 (.807)	.182 (.850)
Traditional Transport Time	.003 (.114)	.013 (.729)	.015 (.826)	.011 (.670)	.012 (.777)	.001 (.151)
Public Transport Time	-.019 (-1.027)	.018 (1.082)	-.003 (-.196)	.037** (2.272)	.016 (1.129)	-.021 (-1.678)
Private Transport Time	.008 (.428)	-.021 (-1.22)	-.004 (-.236)	-.029* (-1.799)	-.011 (-.833)	.017 (1.344)
Traditional Wait Time	-.020 (-1.619)	-.009 (-1.16)	-.004 (-.580)	.011 (.889)	.016 (1.373)	.005 (.746)
Public Wait Time	.044 (1.215)	-.003 (-.087)	.024 (.751)	-.047* (-1.697)	-.019 .783)	.027 (1.181)
Private Wait Time	-.047* (-1.438)	-.034 (-1.15)	-.017 (-.609)	.014 (.505)	.030 (1.147)	.016 (.747)
Usually Examined by Doctor-Public	.170 (.378)	-.234 (-.564)	-.170 (-.419)	-.405 (-1.146)	-.341 (-1.006)	.064 (.218)
Usually Examined by Doctor-Private	9.266 (.193)	.711 (.508)	11.210 (.110)	-8.555 (-.178)	1.644 (.017)	.105 (.003)
Trad Practitioner Not Treat 5 Ills	.552 (.897)	.872 (1.491)	.110 (.195)	.320 (.702)	-.441 (-.998)	-.762* (-1.916)
Traditional Drug Cost	.027 (.184)	.109 (.860)	.080 (.651)	.082 (.676)	.054 (.458)	-.028 (-.296)
Public Drug Cost	-.004 (-.914)	-.007* (-1.911)	-.001 (-.393)	-.003 (-.836)	-.002 (-.700)	.006* (1.928)
Private Drug Cost	-.0007 (-.876)	.0002 (.329)	.0001 (.164)	.0009 (1.448)	.0008 (1.308)	-.0001 (-2.624)
Sick Person Insured	-.156 (-.229)	.432 (.712)	.286 (.469)	.588 (1.236)	.422 (.926)	-.146 (-.401)
Present Value of Household Assets	.00003 (.670)	.00007 (1.536)	.00006 (1.24)	.00004* (1.772)	-.00003 (1.130)	-.00001 (-1.503)
Age of Patient	-.029 (-.573)	-.020 (-.440)	.115*** (2.66)	.009 (.219)	.140*** (3.759)	.135*** (4.268)
Sex (0=Female, 1=Male)	-.023 (-.066)	.144 (-.458)	-.315 (-1.03)	-.167 (-.601)	-.339 (-1.264)	-.171 (-.760)
Urban (0=Rural, 1=Urban)	.720 (1.304)	.110 (.213)	.107 (.212)	-.610 (-1.527)	-.612 (-1.562)	-.003 (-.008)
Illness Is Serious	-.297 (-.712)	.565 (1.597)	-1.15*** (-3.02)	.862** (2.575)	-.854** 2.326)	-1.716 (-5.856)
Education of Sick Person	.051 (.794)	.107* (1.841)	.009 (.163)	.056 (1.120)	-.042 (-.859)	-.098 (-2.40)
Mother Stays Home (0=Works Away, 1=Stays Home)	-.249 (-.584)	.200 (.498)	.265 (.692)	.448 (1.313)	.514 (1.589)	.066 (.223)

*significant at 90% level (|t| > 1.645)
**significant at 95% level (|t| > 1.960)
***significant at 99% level (|t| > 2.576)

TABLE A-7. Conditional Logit Results for Child Outpatients, Ages 0-5 (N=341)--Estimated Coefficients (Asymptotic t values in parentheses)

DEPENDENT VARIABLES (LN) / INDEPENDENT VARIABLES	P(PUBLIC)/P(TRAD.)	P(PRIVATE)/P(TRAD.)	P(NO VISIT)/P(TRAD.)	P(PRIVATE)/P(PUBLIC)	P(NO VISIT)/P(PUBLIC)	P(NO VISIT)/P(PRIVATE)
Constant	-9.225 (-.102)	-.746 (-.368)	-.115 (-.113)	8.479 (.094)	-2.313 (-.017)	-1.075 (-.106)
Traditional Cash Price	.059 (.302)	.207 (1.192)	.393** (2.267)	.149 (1.040)	.334** (2.429)	.185* (1.663)
Public Cash Price	-.071 (-.355)	-.212 (-1.071)	.007 (.039)	-.141 (-.866)	.078 (.516)	.220 (1.435)
Private Cash Price	-.015 (-.354)	.030 (.810)	-.020 (-.533)	.045 (1.445)	-.006 (-.187)	-.051* (-1.859)
Traditional Transport Cost	.948 (.870)	.004 (.004)	.794 (.846)	-.944 (-1.211)	-.154 (-.193)	.791 (1.542)
Public Transport Cost	.011 (.055)	-.191 (-.670)	.029 (.225)	-.202 (-.696)	.018 (.115)	.220 (.827)
Private Transport Cost	.259 (.695)	.407 (1.064)	.343 (1.161)	.147 (.411)	.084 (.281)	-.063 (-.205)
Traditional Transport Time	.007 (.315)	.013 (.683)	-.006 (-.338)	.005 (.283)	-.014 (-.728)	-.019 (-1.539)
Public Transport Time	-.048** (-2.028)	.017 (.785)	-.017 (-.871)	.066*** (2.912)	.031* (1.708)	-.034* (-1.885)
Private Transport Time	.023 (.995)	-.025 (-1.125)	.008 (.417)	-.048 (-2.273)	-.015 (.859)	.033* (1.881)
Traditional Wait Time	-.006 (-.357)	.003 (.220)	.002 (.135)	.008 (.583)	.008 (.521)	-.0009 (-.082)
Public Wait Time	.014 (.283)	-.0001 (-.002)	.031 (.658)	-.015 (-.373)	.016 (.455)	.031 (.915)
Private Wait Time	-.042 (-.983)	-.028 (-.738)	-.031 (-.818)	.014 (.427)	.011 (.321)	-.004 (-.128)
Usually Examined by Doctor-Public	.540 (.925)	.169 (.320)	.207 (.383)	-.370 (-.844)	-.333 (-.765)	.038 (.099)
Usually Examined by Doctor-Private	1.073 (.118)	1.178 (.706)	1.181 (.116)	-9.547 (-.105)	1.080 (.008)	1.063 (.104)
Trad Practitioner Not Treat 5 Ills	.324 (.402)	.395 (.516)	.183 (.237)	.072 (.120)	-.141 (-.238)	-.212 (-.374)
Traditional Drug Cost	.012 (.072)	.020 (.133)	.074 (.493)	.007 (.051)	.061 (.431)	.054 (.451)
Public Drug Cost	-.004 (-.935)	-.009** (-2.194)	-.003 (-.852)	-.005 (-1.137)	.001 (.270)	.006* (1.691)
Private Drug Cost	-.0008 (-.936)	-.0005 (-.645)	-.0001 (-.136)	.0004 (.468)	.0007 (.980)	.0004 (.666)
Sick Person Insured	-.289 (-.343)	.414 (.564)	-.094 (-.123)	.702 (1.144)	.194 (.299)	-.508 (-.962)
Present Value of Household Assets	.0002 (1.634)	.0002* (1.856)	.0002* (1.669)	.00002 (.786)	.000002 (.066)	-.00002 (-.866)
Age of Patient	.007 (.040)	-.161 (-1.046)	.369** (2.440)	-.168 (-1.184)	.362*** (2.699)	.530*** (4.371)
Sex (0=Female, 1=Male)	.103 (.235)	-.202 (-.419)	-.243 (-.617)	-.305 (-.860)	-.346 (-.987)	-.041 (-.134)
Urban (0=Rural, 1=Urban)	.835 (1.177)	.646 (.967)	-.037 (-.052)	-.019 (-.371)	-.873 (-1.614)	-.683 (-1.371)
Illness Is Serious	-.694 (-1.309)	.396 (.913)	-1.235** (-2.516)	1.090** (2.520)	-.541 (-1.110)	-1.631*** (-4.145)
Education of Sick Person	-.047 (-.488)	.032 (.456)	-.030 (-.409)	.080 (1.293)	.017 (.276)	-.062 (-1.151)
Mother Stays Home (0=Works Away, 1=Stays Home	-.092 (-1.491)	-.443 (-.755)	-.612 (-1.049)	.477 (1.087)	.308 (.720)	-.169 (-.420)

*significant at 90% level ($|t| > 1.645$)
**significant at 95% level ($|t| > 1.960$)
***significant at 99% level ($|t| > 2.576$)

TABLE A-8. Conditional Logit Results for Child Outpatients, Ages 6-13 (N=215)--
Estimated Coefficients (Asymptotic t-values in parentheses)

DEPENDENT VARIABLES (LN) / INDEPENDENT VARIABLES	P(PUBLIC)/P(TRAD.)	P(PRIVATE)/P(TRAD.)	P(NO VISIT)/P(TRAD.)	P(PRIVATE)/P(PUBLIC)	P(NO VISIT)/P(PUBLIC)	P(NO VISIT)/P(PRIVATE)
Constant	-1.086 (-.014)	-6.294 (.378)	-2.345 (-.038)	7.380 (.096)	-1.258 (-.013)	-8.630 (-.144)
Traditional Cash Price	.012 (.034)	-.090 (-.282)	.387 (1.292)	-.102 (-.396)	.375 (1.581)	.477*** (2.639)
Public Cash Price	-.836 (-1.499)	-.489 (-1.2[illegible])	-.099 (-.344)	.347 (.637)	.736 (1.434)	.390 (1.279)
Private Cash Price	-.056 (-.689)	-.081 (-1.076)	-.121* (-1.726)	-.024 (.374)	-.065 (-1.058)	-.041 (-.865)
Traditional Transport Cost	-5.657 (-1.506)	-3.747 (-1.142)	-6.914** (-2.157)	1.910 (.743)	-1.257 (-.502)	-3.166** (-2.398)
Public Transport Cost	.516 (.573)	.631 (.737)	-.606 (-.813)	.116 (.135)	-1.121 (-1.399)	-1.237* (-1.878)
Private Transport Cost	-.672 (-.841)	-1.529** (-1.960)	-.438 (-.767)	-.857 (-1.063)	.234 (.338)	1.091* (1.806)
Traditional Transport Time	.39[illegible] (1.480)	.510** (1.970)	.571** (2.209)	.112 (1.245)	.172* (1.931)	.060** (2.163)
Public Transport Time	.019 (.371)	-.005 (-.107)	.020 (.537)	-.024 (-.552)	.001 (.028)	.025 (.899)
Private Transport Time	-.014 (-.290)	.022 (.537)	.003 (.076)	.037 (.938)	.017 (.449)	-.020 (-.772)
Traditional Wait Time	-.245* (-1.892)	-.064*** (-2.979)	-.043*** (-2.687)	.182 (1.414)	.202 (1.574)	.020 (1.345)
Public Wait Time	.040 (.448)	-.051 (-.612)	-.062 (-.798)	-.091 (-1.444)	-.102* (-1.778)	-.012 (-.278)
Private Wait Time	-.012 (-.141)	.059 (.725)	.084 (1.129)	.071 (.986)	.096 (1.433)	.024 (.504)
Usually Examined by Doctor-Public	-1.253 (-1.054)	-2.202** (-2.035)	-2.046** (-2.032)	-.948 (-1.070)	-.793 (-.951)	.156 (.265)
Usually Examined by Doctor-Private	2.031 (.026)	-4.751 (-.287)	3.449 (.054)	-6.782 (-.088)	1.418 (.015)	8.200 (.137)
Trad Practitioner Not Treat 5 Ills	-.614 (-.372)	-.019 (-.124)	-1.852 (-1.261)	.595 (.551)	-1.238 (-1.177)	-1.833** (-2.450)
Traditional Drug Cost	-.054 (-.156)	.231 (.630)	.116 (.332)	.284 (1.056)	.168 (.683)	-.116 (-.607)
Public Drug Cost	-.009 (-.710)	-.005 (-.479)	-.004 (-.396)	.003 (.341)	.005 (.508)	.001 (.202)
Private Drug Cost	.001 (.621)	.003* (1.724)	.003* (1.802)	.002 (1.353)	.002 (1.413)	.00005 (.050)
Sick Person Insured	.474 (.332)	1.638 (1.236)	1.590 (1.252)	1.164 (1.2[illegible])	1.116 (1.231)	-.049 (-.073)
Present Value of Household Assets	-.00009 (-1.435)	.00002 (.552)	.000004 (.155)	.0001* (1.771)	.0001 (1.593)	-.00001 (-.735)
Age of Patient	-.146 (-.882)	-.167 (-1.085)	.020 (.140)	-.021 (-.179)	.166 (1.477)	.187** (2.055)
Sex (0=Female, 1=Male)	.691 (.892)	.650 (.901)	.485 (.717)	-.041 (-.075)	-.206 (-.398)	-.165 (-.404)
Urban (0=Rural, 1=Urban)	.005 (.004)	-1.920** (-1.697)	-.791 (-.744)	-1.925** (-2.225)	-.796 (-.976)	1.129* (1.886)
Illness is Serious	-.224 (-.218)	.141 (.144)	-1.749* (-1.809)	.365 (.549)	-1.525** (-2.265)	-1.900** (-3.564)
Education of Sick Person	.335** (2.167)	.307** (2.230)	.153 (1.181)	-.028 (-.253)	-.183* (-1.723)	-.155** (-2.088)
Mother Stays Home (0=Works Away, 1=Stays Home	.505 (.571)	1.217 (1.468)	1.515** (1.984)	.713 (1.062)	1.010* (1.665)	.297 (.614)

*significant at 90% level ($|t| > 1.645$)
**significant at 95% level ($|t| > 1.960$)
***significant at 99% level ($|t| > 2.576$)

TABLE A-9. Variable Definitions and Sample Statistics for Model Explaining Number of Prenatal Visits (N=495

	MEAN	S.D.*
A. DEPENDENT VARIABLE		
Number of Prenatal Visits	2.1	3.4
B. INDEPENDENT VARIABLES		
Price of Prenatal Visit - Public Facility (Pesos)	.44	1.24
Price of Prenatal Visit - Private Facility (Pesos)	8.99	9.39
Transport Cost to Public Facility (Pesos)	1.54	3.03
Transport Cost to Private Facility (Pesos)	1.11	1.36
Transport Time to Public Facility (Min.)	30.5	40.0
Transport Time to Private Facility (Min.	25.9	31.2
Usual Wait at Public Facility for Prenatal Visit (Min.)	2.9	5.8
Usual Wait at Private Facility for Prenatal Visit (Min.)	4.7	10.5
Mother is Covered by Health Insurance (0=Not Covered, 1=Covered)	.08	.27
Present Value of Household Assets (Pesos)	3236.34	11226.53
Age of Mother (Years)	31.3	6.5
Residence of Mother is Urban (0=No, 1=Yes)	.24	.43
Education of Mother (Years of School Completed)	7.5	3.1
Number of Living Children	4.5	2.7
Mother Either Works at Home or Does Not Work (0=Away from Home, 1=Home)	.86	.35

*S.D. = Standard Deviation

TABLE A-10. Tobit Results for Number of Prenatal Visits (N=495)

VARIABLE	COEFFICIENT	T-STATISTIC
Constant	-4.542	-2.467
Price of Prenatal Visit - Public	- .416	-1.923*
Price of Prenatal Visit - Private	- .031	-1.126
Transport Cost to Public Facility	.106	1.102
Transport Cost to Private Facility	.232	.687
Transport Time to Public Facility	- .020	-2.092**
Transport Time to Private Facility	- .022	-1.349
Usual Wait for Prenatal Visit - Public Facility	.014	.308
Usual Wait for Prenatal Visit - Private Facility	- .017	- .668
Mother Covered by Health Insurance (0=No, 1=Yes)	- .143	- .153
Present Value of Household Assets	.00006	2.633***
Age of Mother	.157	2.616***
Residence of Mother is Urban (0=No, 1-Yes)	1.11	1.74 *
Education of Mother	.333	3.681***
Number of Live Children	- .360	-2.411**
Mother Works at Home or Does Not Work (0=Works Away, 1=Stays Home)	- .376	- .532

*significant at 90% level ($|t| > 1.645$)
**significant at 95% level ($|t| > 1.960$)
***significant at 99% level ($|t| > 2.576$)

TABLE A-11. Variable Definitions and Sample Statistics for Model Explaining Choice of Delivery Type and Location (N=482)

A. DEPENDENT VARIABLE	No.	(%)
Modern Home Delivery	130	27.0
Modern Clinic Delivery	39	8.1
Traditional Home Delivery	313	64.9

B. INDEPENDENT VARIABLES	MEAN	S.D.*
Price of Home Delivery - Traditional Midwife (Pesos)	36.20	21.92
Price of Home Delivery - Closest Modern Practitioner (Pesos)	26.87	35.75
Transport Time for Traditional Midwife to Get to Mother's Barangay of Residence (Min.)	3.4	5.9
Transport Time to Closest Modern Facility Offering Home Birth Attendance (Min.)	23.9	34.4
Modern Home Practitioner is a Physician (0=Not Physician, 1=Physician)	.06	.23
Present Value of Household Assets for Delivering Mother (Pesos)	3744.43	11839.70
Age of Mother in Years	30.5	6.9
Mother's Residence is Urban (0=Not Urban, 1=Urban)	.23	.42
Education of Mother (Years of School Completed)	7.5	3.1
Number of Living Children of Delivering Mother	4.8	2.7

* S.D. = Standard Deviation

TABLE A-12. Conditional Logit Results for Choice of Modern Clinic Delivery, Modern Home Delivery, or Traditional Home Delivery (N=482)--Estimated Coefficients (Asymptotic t-values in parentheses)

Independent Variables \ Dependent Variables (LN)	P (MODERN CLINIC) / P (MODERN HOME)	P (TRADITIONAL HOME) / P (MODERN HOME)	P (TRADITIONAL HOME) / P (MODERN CLINIC)
Constant	-4.593 (-3.493)	1.243 (1.901)	5.836 (4.542)
Price of Home Delivery - Traditional Midwife	.008 (.889)	.007 (1.246)	- .001 (- .107)
Price of Home Delivery - Closest Modern Practitioner	.014*** (2.632)	- .0001 (- .041)	- .014*** (-2.794)
Transport Time for Traditional Midwife	.003 (.101)	- .010 (- .553)	- .013 (- .404)
Transport Time to Closest Modern Facility	.003 (.247)	.010** (2.217)	.007 (.747)
Modern Home Practitioner Is a Physician (0=No, 1=Yes)	-2.220* (-1.956)	- .265 (- .534)	1.955* (1.718)
Mother Insured (0=Not Insured, 1=Insured)	- .337 (- .504)	- .235 (- .526)	.101 (.150)
Present Value of Household Assets	.00002 (1.097)	- .00001 (- .782)	- .00003* (-1.720)
Age of Mother	.025 (.681)	- .005 (- .244)	- .029 (- .832)
Mother's Residence is Urban (0=No, 1=Yes)	.482 (1.066)	- .603** (-2.249)	-1.085** (-2.455)
Education of Mother	.189*** (2.815)	- .080* (-1.904)	- .269*** (-4.067)
Number of Mother's Living Children	- .031 (- .341)	- .027 (.549)	.058 (.652)

*significant at 90% level ($|t| > 1.645$)
**significant at 95% level ($|t| > 1.960$)
***significant at 99% level ($|t| > 2.576$)

TABLE A-13. Variable Definitions and Sample Statistics for Model Explaining Decision to Seek Well-Baby Care (N=407)

	MEAN	S.D.*
A. DEPENDENT VARIABLE		
Infant Had Well-Baby Care (0=No, 1=Yes)	.41	.49
B. INDEPENDENT VARIABLES		
Price of Well-Baby Visit - Closest Public Facility Offering Well-Baby Care (Pesos)	.47	1.44
Transport Cost to Public Facility (Pesos)	1.54	2.93
Transport Time to Public Facility (Min.)	31.04	40.45
Usual Wait at Public Facility for Well-Baby Visit (Min.)	6.57	15.71
Mother is Covered by Health Insurance (0=Not Covered, 1=Covered)	.07	.25
Present Value of Household Assets (Pesos)	3466.45	12188.08
Age of Mother (Years)	31.23	6.37
Residence of Mother is Urban (0=No, 1=Yes)	.23	.42
Education of Mother (Years of School Completed)	7.46	3.13
Number of Living Children	4.65	2.60
Sex of Baby (0=Female, 1=Male)	.53	.50
Type of Delivery (0=Traditional, 1=Modern)	.35	.48
Mother Either Works at Home or Does Not Work (0=Away from Home, 1=Home)	.86	.34

*S.D. = Standard Deviation

TABLE A-14. Probit Results for the Choice of Seeking Well-Baby Care or Not Seeking Well-Baby Care (N=407)

VARIABLE	COEFFICIENT	ESTIMATED T-STATISTIC
Constant	-1.539	-3.011
Price of Well-Baby Visit - Public Facility	-0.0456	-0.937
Transport Cost to Public Facility	-0.0529	-1.121
Transport Time to Public Facility	-0.0003	-0.128
Wait Time at Public Facility	0.0134	3.040***
Mother Insured (0=Not Insured, 1=Insured)	0.2592	.913
Present Value of Household Assets	-0.00003	-2.559**
Age of Mother	-0.0011	-0.062
Mother's Residence (0=Rural, 1=Urban)	0.2132	1.265
Education of Mother	.0912	3.435***
Number of Living Children	.0219	0.524
Sex of Baby (0=Female, 1=Male)	0.1530	1.148
Type of Delivery (0=Traditional, 1=Modern)	0.4019	2.782***
Mother Works at Home or Does Not Work (0=Works Away, 1=Stays Home)	.4177	2.033**

*significant at 90% level ($|t| > 1.645$)
**significant at 95% level ($|t| > 1.960$)
***significant at 99% level ($|t| > 2.576$)

-2.0 Times Log Likelihood Ratio = 54.1192; Regression Significant at 99.5% Level ($\chi^2_{99.5,13} = 29.82$)

TABLE A-15. Variable Definitions and Sample Statistics for Model Explaining Decision to Seek Immunization(s) for Infant (N=406)

	MEAN	S.D.*
A. DEPENDENT VARIABLE		
Whether Child Had Any Immunizations (0=No, 1=Yes)	.06	.24
B. INDEPENDENT VARIABLES		
Price of Visit for Immunization - Closest Public Facility Offering Immunizations (Pesos)	1.45	6.05
Transport Cost to Public Facility (Pesos)	1.52	2.92
Transport Time to Public Facility (Min.)	30.71	40.47
Usual Wait at Public Facility (Min.)	4.06	11.84
Mother Covered by Health Insurance (0=No, 1=Yes)	.07	.25
Present Value of Assets (Pesos)	3474.01	12132.07
Age of Mother in Years	31.26	6.36
Residence of Mother (0=Rural, 1=Urban)	.23	.42
Education of Mother (Years of School Completed)	7.47	3.14
Number of Living Children	4.64	2.60
Sex of Baby (0=Female, 1=Male)	.52	.50
Type of Delivery (0=Traditional, 1=Modery)	.35	.48
Mother Either Works at Home or Does Not Work (0=Works Away, 1=Stays Home)	.86	.34

*S.D. = Standard Deviation

TABLE A-16. Probit Results for the Choice of Getting Baby Vaccinated (At Least One Vaccination) or Not Getting Baby Vaccinated (N=406)

VARIABLE	COEFFICIENT	ESTIMATED T-STATISTIC
Constant	-3.5704	-4.160
Price of Child Immunization - Public Facility	0.0268	1.591
Transport Cost to Public Facility	0.0330	0.626
Transport Time to Public Facility	-0.0101	-1.367
Wait Time at Public Facility	0.0044	0.501
Mother Insured (0=Not Insured, 1=Insured)	0.7648	2.343**
Present Value of Household Assets	-0.00002	-1.346
Age of Mother	0.0261	2.808***
Mother's Residence (0=Rural, 1=Urban)	-0.0957	-0.358
Education of Mother	0.0585	1.597
Number of Living Children	-0.1526	-2.220**
Sex of Baby (0=Female, 1=Male)	-0.0346	-0.157
Type of Delivery (0=Traditional, 1=Modern)	0.0198	0.085
Mother Works at Home or Does Not Work (0=Works Away, 1=Stays Home)	0.0411	0.126

*significant at 90% level ($|t| > 1.645$)
**significant at 95% level ($|t| > 1.960$)
***significant at 99% level ($|t| > 2.576$)

-2.0 Times Log Likelihood Ratio = 25.1784; Regression Significant at 97.5% Level ($\chi^2_{97.5,13} = 24.74$)

TABLE A-17. Percentage of Change in Probabilities of Dependent Variables for All Models When Independent Variables Are Iteratively Increased by 10 Percent from Their Mean Values (Dummy Variables Moved to New Category)

DEPENDENT VARIABLES / INDEPENDENT VARIABLES	Change From Mean Value (%)	All Adult Outpatients				All Child Outpatients				Delivery			Prenatal	Well-Baby	Immunizations
		Traditional	Public	Private	No Visit	Traditional	Public	Private	No Visit	Modern Home	Modern Clinic	Traditional Home	Percent Change in Number of Visits	Change in Prob. of a Visit	Change in Prob. of a Visit
Probability at Mean of Independent Variables		.038	.140	.322	.500	.102	.154	.325	.419	.279	.045	.676		.400	.038
Traditional Cash Price	+10	-.1	+.09	-.3	+.5	-4	-2	-1	+3	-2	+1	+.7			
Public Cash Price	+10	-.1	+.4	-.06	+.02	+.5	-.2	-.5	+.3	-.1	+4	-.2	-.1*	-.2	+.8
Private Cash Price	+10	+2	+2	-.4	-.4	+2	-.7	+3	-3				-.2		
Traditional Transport Cost	+10	-.3	+.2	-.01	-.01	-.1	+.6	-.1	+.1						
Public Transport Cost	+10	+1	-4	+.3	+.7	-.1	+.3	-.6	+.4				+.1*	-.8	+1
Private Transport Cost	+10	+4	-2	+.6	-.2	-.7	+.2	-.9	+1				+.2		
Traditional Transport Time	+10	+1	+.5	-.01	+.4	-.8	-.6	+.2	+.3	+.2	+.3	-.1			
Public Transport Time	+10	-2	+2	-.9	+.1	-.5	-5	+4	-1	-3	-1	+.7	-.4	-.09	-7
Private Transport Time	+10	+.5	+.5	+.03	-.2	+2	+4	-4	+.9				-.4		
Traditional Waiting Time	+10	-.06	-.1	+.3	-.2	+.3	-.5	-.1	+.2						
Public Waiting Time	+10	-.5	+.4	-2	+.9	-.6	+1	-.7	+.5				+.03	+.9*	+.4
Private Waiting Time	+10	+2	-.3	+.9	-.6	+.9	-.7	-.3	+.3				-.05		
Usually Examined by a Doctor - Public	=1	-19	-17	+4	+4	+6	-16	-6	-3	+23	-85	-4			
Usually Examined by a Doctor - Private	=1	+24	-10	-6	+5	-5	+2	-4	+3						
Traditional Practitioner Does Not Treat 5 Illness	=0	+23	+6	+4	-6	+6	-2	-6	+4						
Traditional Drug Cost	+10	-.9	+.3	-.07	+.03	-.3	-2	+.1	+.03						
Public Drug Cost	+10	+3	-.01	-.9	+.4	+.8	-.09	-.8	+.5						
Private Drug Cost	+10	+2	-3	+2	-.6	+.03	-2	+.6	+.3						
Sick Person Insured Insured	=1	-99	-43	-5	+23	-20	-31	+17	+3	+17	-14	-6	-.8	+24	+280*
Present Value of Household Assets	+10	-5	+.7	+.8	+.01	-2	-.9	+.8	+.2	+.3	+.8	-.2	+.1*	-.9*	-2
Age	+10	+5	+2	+5	-4	-2	-3	-3	+4	+.6	+8	-.8	+3*	-.3	+61*
Sex	=1	-6	-28	+5	+5	+9	+10	+1	-7					+7	-4
Urban Residence	=1	-17	-34	+14	+19	-15	+47	-8	-8	+30	+88	-18	+5*	+16	-15
Education	+10	+5	+.3	+3	-3	-3	+.3	+4	-3	+3	+19	-3	+2*	+7*	+10
Seriousness of Illness	=1	-10	+15	+73	-51	+11	-12	+73	-55						
Mother Works at Home or Does Not Work	=1					-3	-8	+1	+3				-.3	+5*	+1
Number of Living Children	+10									-.8	-.2	+.5	-1*	+1	-14*
Had Modern Delivery	=1													+26*	+3

*statistically significant at minimum of 10 percent level

TABLE A-18. Percentage of All Visits to Each Type of Practitioner, by Model, Accounted for by Lower and Higher 40 Percent of Asset Distribution for Each Sample

	Adult Outpatient		Child Outpatient		Prenatal		Delivery		Well-Baby		Immuni-zation	
	Low	High	Low	High	Low	High	Low	High	Low	High	Low	High
Traditional	42	39	53	32			44	34				
Public	44	32	37	39	27	46						
Private	33	45	40	45	24	64						
No Visit	43	40	38	38	53	29						
Modern Clinic							21	74				
Modern Home							36	45				
Yes									34	46	28	56
No									45	36	41	39

TABLE A-19. Percentage Distribution of Visit Choices, by Model, for Lower and Upper 40 Percent of Asset Distribution for Each Sample

	Adult Outpatient		Child Outpatient		Prenatal		Delivery		Well-Baby		Immuni-zation	
	Low	High	Low	High	Low	High	Low	High	Low	High	Low	High
Traditional	15	14	15	9			71	55				
Public	17	13	15	16	26	45						
Private	24	33	31	36	8	20						
No Visit	43	41	39	40	66	36						
Modern Clinic							4	15				
Modern Home							24	30				
Yes									20	36	4	9
No									80	64	96	91

TABLE A-20. Percentage of All Visits to Each Practitioner Accounted for by Lower and Upper 40 Percent of Asset Distribution for Each Sample--Adult and Child Outpatients, by Seriousness of Illness

	Adult Outpatient				Child Outpatient			
	Serious		Nonserious		Serious		Nonserious	
	Low	High	Low	High	Low	High	Low	High
Traditional	31	63	46	29	59	35	51	31
Public	47	26	43	34	65	12	31	46
Private	43	33	27	54	42	33	39	52
No Visit	48	26	42	42	42	31	38	39

TABLE A-21. Percentage Distribution of Visit Choices for Lower and Upper 40 Percent of Asset Distribution for Each Sample--Adult and Child Outpatients, Controlling for Seriousness of Illness

	Adult Outpatient				Child Outpatient			
	Serious		Nonserious		Serious		Nonserious	
	Low	High	Low	High	Low	High	Low	High
Traditional	11	26	16	10	18	15	14	8
Public	20	14	16	12	19	6	13	18
Private	45	43	16	30	43	59	27	32
No Visit	24	17	51	48	20	21	46	43

NOTES

1. This is an economics term which implies that a household will demand fewer units of public medical services as its income increases. Additional income may influence the household to use a private clinic instead.

2. In 34 of the poorest countries, accounting for almost a third of the world's population, there are an average of about 25,000 people per physician. This compares to 610 people per physician in the United States (calculated from Golladay, 1980, pp. 78-82).

3. A barangay is the smallest political unit in the Philippines. Barangays usually contain 1,000 to 2,000 people; a large town would be divided into several barangays.

4. The word curative is used to contrast this type of medical care with preventive care. It encompasses care of acute illness, accidents, and inpatient care such as surgery.

5. The Mwabu work is based on an extraordinary set of data that should be a model for other utilization data collection efforts. Along with the Colson data, it recognizes that facility use is not a discrete phenomenon that begins and ends with the first visit; rather, treatment strategies are pursued until the illness triumphs or other bottlenecks are encountered that cannot be overcome. The Mwabu data, if combined with price, income, and other household information, would lend itself to the type of analysis conducted later in this study.

6. This figure is probably low since it is heavily weighted by Latin American countries, where the rates are significantly lower than in the rest of the Third World.

7. Opportunity cost is an economic concept that treats the true cost of a good or service as the cost of other goods and services that must be given up in order to purchase it. The opportunity cost of making a health service visit is the total amount of resources (cash and value of time) consumed in making the visit.

8. Alternatively, this odd ordering of costs might simply have been because the data were facility-based and applied only to actual users of the services. It is conceivable that the health center cost figure was heavily weighted by short trips but the aid post figure was weighted by a few long trips.

9. This effect was for a sample of households which used both a private and a government clinic at least once. A logit technique was used for the estimation, with a dependent variable of the following form: P(government visit)/P(private visit).

10. A problem specific to antibiotics such as penicillin is that they cause quick remission of symptoms before a cure has actually been effected, so patients may lose interest in following the prescription.

11. In constructing demand equations wherein the dependent variable is of the yes/no type, consumers are assumed to use only one of the alternatives at a time. If use of different services is a simultaneous, recursive, or interactive problem, then proper modeling should capture these attributes of the decision process.

12. For diseases, responses classified as scientific referred to germs, dirt, fatigue, and malnutrition as causal agents. Unscientific responses included God, fate, and did not know.

13. For prevention, "scientific" responses included vaccination, cleanliness, and good food. "Nonscientific" were no response or did not know.

14. See Joseph (1971) for a good, simple exposition of the underlying model as well as a selective and critical review of nine empirical studies from this era.

15. Nonearned income is, at least for neoclassical economists, a misnomer. It includes nonwage income such as rents, profits, and interest, earned by other factors of production an individual might own which do not require the direct use of labor time in order to be earned.

16. E.g., unlike other forms of human capital, such as education, health capital is assumed not to affect the wage rate.

17. The marginal efficiency schedule for an individual's health capital must be inelastic for age to be positively correlated with medical service consumption. Slightly less accurate, but more understandable, an individual must be very insensitive to medical care prices in order to keep consuming more and more health services as his body deteriorates. At some point it simply becomes too expensive to maintain a dying body. Yet it would seem reasonable to expect that more people are at least somewhat insensitive to health care prices; up to some point they will spend money quite freely on medical care to arrest or reverse the effects of physical deterioration.

18. There is no stock of health as such or depreciation rate since this is a one-period model.

19. If equation (30) is labeled as a production function, then this is really a household production framework in which Heller simply fails to specify household production functions for all goods.

20. If health is treated as an investment good, then the relationship between age and the demand for medical services depends on the marginal cost and marginal productivity of additions to health capital.

21. These include lay doctors, dispensary staff, nuns, medical post nurses, and physicians.

22. The marginal productivity of own time in producing health.

23. This prediction is an artifact of this specific formulation. If time is taken as an input in home production, then conceptually at least, all waking hours are spent earning income of one sort or another. Thus an increase in the wage rate, or the opportunity cost of time, will raise the value of what is produced at home. Hence income in the home production model always goes up when the wage rate increases.

24. This section draws heavily on two sources: United States Agency for International Development/Philippines 1981a and 1981b.

25. This section draws heavily from two sources: Woolley et al. (1972d) and Adorna (1976).

26. For prenatal, well-baby, and immunization services, not even expenditure information had been gathered.

27. Other information collected in this survey included the promotional practices of infant food companies, the availability and prices of infant foods in stores, environmental sanitation in the barangays, and health professionals' characteristics (knowledge, attitudes, and practices).

28. Of these 69, 53 percent were a child of the respondent, 41 percent were a relative, and 6 percent were unrelated.

29. The probit technique, as mentioned in the next section, is based on normally distributed errors and would therefore be preferable to the multinomial logit technique we used. However, the probit technique poses virtually insurmountable computational problems for unordered comparisons; so its attractive properties could not be taken advantage of for the outpatient and delivery models (see Judge et al., 1980, for a discussion of these two techniuqes). It is likely that despite the differences in the two approaches, the results would be quite similar.

30. Corrections to the BMS 1978 tapes are being made but will not be available until late 1982.

31. Puericulture centers are charitable organizations which receive 50 percent of their funding from the government.

32. The size of the model without the interactive effects was already at the limits of accuracy for existing computers and the optimization techniques being used.

33. This phenomenon was discussed in the beliefs section of chapter 3.

34. All of the models, save the prenatal model, involved nonlinear estimation techniques and qualititive dependent variables. Consequently, elasticities could not be calculated and, in fact, would make no sense for these models. In order to provide simplified comparisons, however, each model was estimated with all independent variables, including dummies, held at their mean values. The probability of each type of visit for this perfectly average (and nonexistent) individual appears in the first row of table A-17 for each model. For the adult outpatient model, for example, this individual was 50 percent male, 20 percent

urban, faced a price of 2.1 pesos for a traditional visit, and so on (see table A-1 for the other averages). This perfectly androgynous sick individual would have had a 3.8 percent chance of making a traditional visit, a 14 percent chance of making a public visit, a 32 percent chance of making a private visit, and a 50 percent chance of making no visit. The model was then reestimated once for each independent variable after bumping each continuous variable (in turn) up 10 percent from its mean and each dummy variable to a new category. The percentage change in the probability of each visit was calculated after each reestimation. So, according to table A-17, when the traditional price was increased 10 percent above its mean value, while holding all other independent variables at their means, this change alone was estimated to cause a 4 percent reduction in the probability of a traditional visit by our average person. Alternatively, holding all other values at their means but changing our average person into a complete male (sex changed from .5 to 1), caused the probability of a traditional visit to fall by 6 percent. All entries in table A-17 can be interpreted in this fashion; the figures reported take into account the simultaneous nature of the decisions.

Great care must be taken in using table A-17. First, in the three logit models, no significance levels can be reported. Since most of the economic variables were not statistically significant, a large number of these effects may not represent a causal link any more than they represent pure chance. In the discussion that follows we consider these effects only when the variables were consistently significant in the results reported in tables A-2 through A-12. For the prenatal, well-baby, and immunization models, cells are starred where they coincide

with variables significant at the 10 percent level. Second, point estimates are given. No reference is made to the width of the confidence intervals involved since they could not be calculated. Some of the numbers reported may be very accurate and some may be extremely inaccurate, but there is no way to differentiate between the good and bad estimates.

35. The value of assets was tabulated for each sample and divided into quintiles. If our asset variable is a good income proxy, then this effort should have divided each sample roughly into income quintiles as well. The two upper and the two lower quintiles were grouped together and are presented as the higher 40 percent and lower 40 percent of each distribution in tables A-18 through A-21. We decided that these larger groupings made more sense than choosing, say, the highest quintile and the lowest quintile. The tables show differences in behavior for higher and lower asset groups as opposed to the highest and lowest.

Table A-18 shows the distribution of visits of each type by asset class. For instance, 33 percent of private modern adult outpatient visits were accounted for by the lower asset class, and 45 percent were accounted for by the higher class. If the patient load at private clinics had perfectly represented all asset classes, then the lower and upper groups would each have contributed 40 percent of the patients. Table A-19 looks at the other side of the coin. It shows the distribution of visit choices within each asset class. For example, 24 percent of the lower asset class chose private modern practitioners while 33 percent of the upper asset class chose that alternative. Tables A-20 and A-21 are perfectly analagous to these tables, except that they apply only to outpatient visits and control for seriousness of the illness.

It must be emphasized that tables A-18 through A-21 are presented

only for descriptive purposes. They show how visit type and asset class are correlated, whereas the models we estimated, among other things, attempt to explain the visit choice, using assets as an explanatory variable and controlling for all other effects. On the basis of tables A-18 through A-21, asset class could as easily be explained by type of medical visit as medical visit could be explained by asset class. There is no causal link implied on the basis of these tables alone.

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