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A HOUSEHOLD HEALTH CARE DEMAND STUDY IN THE KISANTU AND BOKORO REGIONS OF ZAIRE

VOLUME III: Determinants of Demand for Curative Ambulatory Care

MARCH, 1990

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Resources for Child Health Project (REACH)
Basic Rural Health Project (SANRU)

A HOUSEHOLD HEALTH CARE DEMAND STUDY IN THE KISANTU AND BOKORO REGIONS OF ZAIRE

VOLUME III: DETERMINANTS OF DEMAND FOR CURATIVE AMBULATORY CARE

DRAFT

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NOTE TO THE READER

This document is Volume III of a set of three volumes presenting the results of this study of health care demand. Volume I (Vian, 1989) presents a description of the study design and data collection techniques. Volume II (Bitran, 1989c) provides further description of the sampling methodology, background information, and descriptive results. This volume presents an econometric study of demand determinants and makes recommendations to policy- and decision-makers in Zaire. A separate document (Budd and Vian, 1988) provides simple frequency tables for the survey data. Finally, a related document (Bitran, 1989e) presents a computerized model of health care financing which was developed as part of REACH's long-term intervention in Zaire with additional support from SANRU and the Economic Development Institute of the World Bank.

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I. EXECUTIVE SUMMARY

A study of health care demand was jointly undertaken by the Resources for Child Health Project (REACH) and the Basic Rural Health Project (SANRU), both AID-funded activities. The objectives of the study were to describe the patterns of utilization of curative and preventive health care services in selected areas of two Zairian health zones and to provide an analysis of demand determinants for curative ambulatory care in those areas. The ultimate goal of the study is to help improve the population's welfare by supplying useful information to health care financing policy-makers in Zaire.

The study of curative ambulatory care demand determinants presented in this report shows that in the selected health areas where the survey took place health centers are perceived by the population as providing care of high quality. In contrast, the health services of private dispensaries and pharmacies are viewed as being of poor quality. Quality differentials are so strong that if all three types of provider had the same price, travel and waiting times as the health centers, over 80% of the people seeking care would choose health centers while private dispensaries and pharmacies would each capture only 10% of all patients.

The three types of providers do not have the same prices, waiting and travel time as shown by the survey results. In particular, health centers are the most expensive source of treatment, have the highest waiting time, and are farther away, on the average, from people's home. Despite this, health centers capture considerably more patients that private dispensaries which are facilities that provide the same types of curative services but, as shown by the analysis, of much lower quality.

The study has also found that price is an important determinant of demand for curative ambulatory care. The analysis showed that if health center prices were increased in real terms beyond current levels, demand for health center curative care would drop significantly as people would shift away from health centers toward less expensive sources of care. Conversely, if real health center prices were lowered both overall demand and demand for health center care would increase in an important way.

The importance of prices on demand opens room for debate regarding the appropriate level of prices at the para-statal health centers. Previous studies of health care financing in Zaire have shown that in some health zones curative care prices are set well above direct marginal costs (drugs, other medical supplies, and labor) to pay for both the cost of supervision and other central office costs and for preventive care services which are sold at highly subsidized prices.

Additional external financial assistance in the form of salaries of certain employees, supervision subsidies, and subsidies for the provision of preventive services would permit zone health centers to lower their curative care prices, improve service quality, or both. This, in turn, would result in higher demand for curative services as more people would seek care when ill or injured and a higher proportion of them would go to health centers.

If deemed necessary, additional studies could be conducted to assess the extent to which the study findings hold in other health zones. In any case, the study suggests that greater, appropriately targeted financial support of the health zones by the government could have a major impact on utilization of curative health services and therefore on people's well being. A review of the government's current policy of providing meager financial support to the health zone system should therefore be at the top of the policy agenda.

II. INTRODUCTION

Health care financing in Zaire is a paradox. Zaire ranks among the poorest countries in the world with an estimated annual per capita GNP of US$ 150. [1] Yet in most of the country curative health care services are sold at prices that approximate or sometimes exceed cost. A study of health care financing that analyzed the financial performance and cost recovery systems of 10 out of the country's 306 health zones showed that in 1985 health zones recovered on average 80% of their recurrent costs from user fee proceeds. [2]

Health zones are highly decentralized para-statal entities that provide curative and preventive health care services through a network of ambulatory and inpatient facilities. The health zone system has been praised for effectively providing a comprehensive array of health care services of acceptable quality to both urban and rural populations throughout the country. The system is based on a high level of community participation both in management and in promotive activities.

The relatively high prices of health services have raised questions about their impact on demand and therefore on the population's welfare. Recent studies of health care financing in Zaire have recommended levels of government subsidies for the health zones substantially higher than the meager levels reported in the above-cited study. In principle, higher government subsidies would allow the zones to improve the quality of their services and/or lower their prices with a positive impact on demand.

In order to improve our understanding of health care demand in Zaire, a study of health care demand based on household data was undertaken jointly by the Resources for Child Health Project (REACH) and the Zaire-based Basic Rural Health Project, both AID-funded projects.

This report constitutes the final document presenting the results of the health care demand study and focuses on the demand for curative ambulatory care. It is hoped that the information provided here will ultimately help improve the well-being of the Zairian population.

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[1]. World Development Report 1989, The World Bank.

[2]. See Bitran, Munkatu et al., 1987.

III. STUDY GOALS AND METHODOLOGY

A. Goal and Objectives

The goal of this study is to provide decision makers in Zaire with information that can be used as input when assessing the country's health care financing policies with the ultimate goal of improving the population's health status. The study objective is to explain consumer behavior with regard to the consumption of curative ambulatory health services in selected health areas of two health zones.

Consumer behavior is studied by analyzing individual decision making. Individuals who have a health problem face two types of decision: they have to decide whether or not to seek care outside the home and, those who decide to seek outside care, must decide what provider to visit.

For the purpose of this study, providers have been clustered into three main groups: those that belong to the official network of health facilities, or health zone facilities; those who run a private health dispensary and are not affiliated with the health zone system, or private dispensaries; and those who sell drugs in the market and are not health zone affiliates, or pharmacies. A more precise description of these three types of providers can be found in Volume II (Bitran, 1989c).

The decisions to seek care and to choose a provider are presumably affected by a number of variables such as the individual's income, education, age, gender, type of health problem, the distance between the person's home and the provider's location, providers' prices, and the person's perception of the quality of care of different providers. Variables like those listed above, which are believed to influence people's health care seeking decisions, are interchangeably referred to in this study as demand determinants or explanatory variables.

B. Individual Decision Making and Health Care Demand

The demand for health care is the amount of health services that people are willing to obtain as a function of the services' prices, given people's socioeconomic and demographic characteristics, their perception of the services' quality, the people's geographic location relative to the location of providers, and other factors which characterize the people, the providers, and the environment.

The demand for health care from a given provider can be inferred if one knows how many people would seek care outside the home if they had a health problem, how many of those would choose the given provider, and how much care each would obtain from the provider. For example, in the health areas where the survey took place, there were 669 people who reported a health problem during the two weeks preceding the survey, representing 3.55% of the 18,831 people living in the households of the sample. Approximately 80% of those who had a health problem, or 534 persons, sought care outside the home and about 44% of those seeking care outside the home went to a zone health center. Finally, the people who went to zone health centers made an average of about 2 visits to the health center during the recall period. Thus, the demand for curative health care from health centers during the survey's two-week recall period can be calculated by multiplying the health areas' population of 18,831 people times 0.0355 (proportion of people with a health problem) times 0.80 (proportion of those with a health problem seeking care outside the home) times 0.44 (proportion of those seeking care outside the home going to a health center) times 2 (average number of visits of those going to health centers). The result of the above calculation is 470 visits which corresponds roughly to the demand for health center curative ambulatory visits. Thus, if one knows the population's average illness incidence and accident occurrence rate, one can infer people's demand by knowing about people's decision to seek care outside the home and to choose a particular provider, and about the typical quantity of services demanded per illness episode.

C. Usefulness of Demand Determinants Analyses

Understanding the determinants of demand is important to policy makers. By showing the extent to which household and provider characteristics influence individual behavior, this study can help decision makers to determine what policies to adopt to achieve desired public health goals. For example, this study can show how prices affect health care demand (i.e., people's demand price elasticity) at any given price level and across income groups. With such information, government officials and health zone managers can anticipate the likely impact on demand for health care of measures such as subsidizing certain prices for the poor and providing health insurance.

Many variables that are determinants of demand cannot be influenced by decision makers in the short term. For example, household income has been shown to be an important determinant of demand. [3] Nevertheless, health zone managers of public health officials can do little to modify the population's income distribution to achieve desired health goals. Yet

[3]. See, for example, Gertler, Locay, and Sanderson (1987).

understanding how a person's income affects his or her health care seeking behavior is extremely important from a public policy viewpoint, for it allows decision makers to better target their policies to certain population strata.

D. Household Utilization Survey

1. Sample Design Summary

The sample for the study is a stratified multi-stage design. Two health zones, Kisantu and Bokoro, define the geographic scope of the target population of this study. [4] These two zones therefore represent strata. A sample of health areas was drawn from each stratum (zone). Two health areas, Kikonka and Kipako, out of a population of eleven, were drawn from Kisantu, while two, Tolo and Semendwa, out of 35 health areas, were drawn from Bokoro. The health areas constitute first stage sampling units.

At the second stage of sampling, villages were selected from each sample health area. Kikonka contains only one village and it was included in the sample. Nineteen villages were selected from Kipako from a total of 36, while two (out of three) villages and two (out of five) villages were selected from Tolo and Semendwa, respectively.

At the third stage of sampling, households were randomly drawn into the sample. In addition to the collection of household level data, the questionnaire collected information on each eligible household member (see definition of eligibility below). The survey was therefore intended to provide household level and person level estimates. Any estimates derived from the survey must, however, be viewed cautiously because probability sampling procedures were not employed except for the last stage of sampling to select households. This means, technically, that one cannot draw inferences from the sample to the target population (i.e., the two health zones of Kisantu and Bokoro).

Volume II (Bitran, 1989c) provides household and person level estimates and their standard errors by treating the sample as a probability sample. Standard errors were computed using the Taylor series linearization technique so as to reflect the multi-stage nature of the sample

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[4]. Zaire has 306 officially designated health zones.

design.[5] Multi-stage cluster samples generally yield higher standard errors than simple random samples of the same size. The design effect (Deff) equals the ratio of the sampling variance of the cluster sample to that of a simple random sample. A Deff value of 1.20, for example, means that the sampling variance was increased by 20% when compared to a simple random sample. Deff values vary from survey to survey variable and can be less than 1.0.

As shown in Volume II, the average design effect for the overall sample is 4.59, while for Kikonka it is 4.23 and for Bokoro it equals 4.85. These are high design effects which is partially attributable to the fact that only two health areas were selected per zone. Estimates by first stage sampling unit (i.e., health areas) were also computed and are shown below:

Health Area	Design Effect
Kikonka	0.92
Kipako	1.28
Tolo	1.12
Semendwa	1.01

The average design effect for each health area is close to 1.0 indicating that the increase in sampling variance from using a two-stage cluster sample (villages and households) in each health areas is small. This is partially due to the fact that a high proportion of villages in each health area was included in the sample. Volume II also provides design effects calculations for the coefficients of an ordinary least squares (OLS) hedonic price equation. The design effects for the OLS coefficients were found to be generally around one. Design effects for regression coefficients are generally smaller than design effects for descriptive statistics such as means and proportions. Moreover, when more sophisticated estimation techniques --such as those employed in this volume-- are used (i.e., nested logit), smaller design effects (the square root of the OLS Deff) can be expected.

In sum, given the high design effect at the health zone level and the non-random nature of the selection of health areas, the statistical validity of this study is limited to the health area level. This means that no attempts are made here to generalize the results of the study beyond the four health areas chosen, i.e., to the health zone level, or to the national scale.

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5. Standard errors were computed using PROC SESUDAAN in SAS. Mike Battaglia, Director of Sampling at Abt Associates, provided guidance in computing the standard errors.

2. Criteria for Selecting Health Zones, Health Areas, Households and Individual Respondents.

Health zones and health areas were chosen with the aim of observing variability in a few variables which have been shown to be important determinants of the demand for health care (e.g., income, travel time to health providers, degree of market competitiveness, and prices). Kisantu and Bokoro were chosen because overall income levels reportedly differed markedly between the two zones. [6] In addition, both zones contrast in that Kisantu is a semi-urban zone near Kinshasa with lower costs for drugs and other inputs while Bokoro is a distant and hard to reach zone with higher input costs. Since health centers' curative ambulatory care prices are nearly equal to cost and given that price is an important determinant of demand, input price differentials were also and important criterion for choosing the zones.

Within the zones, health areas were chosen to include one with population scattered over a large area (Kipako), one with high population density (Kikonka), and two with intermediate population density (Tolo and Semendwa). The presence of a large number of health providers that competed with the zone health centers was also an important criterion for choosing all four health areas.

Within each village households were chosen using a screening procedure consisting of randomly selecting households and keeping those that met any of the following three criteria:

(1) had somebody with a health problem with onset during the two weeks preceding the survey;
(2) had one or more women who had given birth during the 12 months prior to the survey; and
(3) had children under the age of five.

Households that met the first criterion constituted the sample for the study of curative ambulatory care demand. [7] Households meeting the second and third criteria constituted the samples for studying the demand for obstetric and preventive health care services.

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[6]. This income differential was confirmed through the survey. See Bitran, 1989c.

[7]. Less than 5% of the people from sample (1) who sought care outside the home obtained inpatient care. These cases were dropped from the sample in order to analyze only the demand for curative ambulatory care.

Within the households that met criterion (1) the person who had had a health problem was interviewed directly if he or she was 15 years of age or older. Otherwise, the mother, father, or other adult was interviewed on behalf of children under 15.

Based on actual utilization of health services as provided by the survey, this study used statistical techniques to assess the individual effect of the explanatory variables on demand, including those cases where people did not go to a provider. These techniques are described in Appendix A.

E. Behavioral Assumptions

In order to decide which variables to incorporate in the analysis and how to incorporate them, a model of consumer behavior has been developed and is described in Appendix A. The basic assumptions behind the behavioral model are explained here.

An assumption often made in economic theory, and adopted here, is that people make consumption decisions to maximize their utility. Utility is not a measure of wealth or income, but is rather a measure of the value that a person places on the consumption of goods and services or, in other terms, the satisfaction that an individual draws from consumption. The process whereby people assign utility to consumption varies among individuals. Thus, different people may obtain a different utility from consuming the same good or service (e.g., one visit to the same doctor). Demographic traits, the nature of the health problem, differences in perceptions and tastes are therefore expected to result in different utility and, thus, in different health care seeking decision by individuals, even when facing the same options.

A second assumption made in this type of analysis is that individuals must make consumption decisions under a budget constraint. In this case, the budgetary constraint is the monthly household income. [8] The budget constraint simply states that a person cannot spend more money purchasing goods and services that he or she has available.

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[8]. As explained in Volume II, household monthly cash expenditures were used as a proxy for monthly income. It can be argued that a budgeting horizon greater than one month should be considered. However, in all cases the expenditure associated with an illness episode represented less than 20% of household monthly income, suggesting that the assumption of a one-month budgeting period may not be too restrictive.

The final and key assumption underlying the behavioral model is that people are rational decision makers. Their problem is to decide how much health care and other goods and services to consume in order to maximize their utility and stay within their budget constraint. The assumption of rationality means that people will make consumption decision in order to achieve the maximum possible utility without exceeding their budget restriction. For example, a person who visits a doctor will prefer to pay less rather than more for the visit simply because by paying less he or she will have more money left to buy health care and other goods. Similarly, it is expected that a person who must choose among two identical doctors, one being around the corner and the other being 10 kilometers away, will choose the former unless he or she draws utility from travelling. Of course, if the doctors were not identical in the mind of the patient (i.e., things other than travel time were not the same), then it would be rational for the patient to choose the doctor who is farther away if the individual believes that the more distant doctor charges a lower price or provides better quality care.

F. Descriptive Analysis and Multiple Regression Techniques

The demand for health care is influenced by a multitude of variables, as discussed earlier. In order to isolate the effect on demand of each of these variables, it is necessary to use multiple regression statistical techniques. Studies that present data on demand patterns through two dimensional tables are very useful in describing health care seeking patterns and raising questions about those patterns but they can say little about which factors affect demand and their relative importance. This limitation of descriptive analyses is illustrated through a hypothetical example below.

Suppose that a researcher obtained from a survey the results shown in Table III.1. The naive researcher would be tempted to infer that there exists a positive correlation between price and utilization and, thus, to increase utilization of government facilities, the government should increase its prices. If, however, the researcher tabulated some additional results, such as average patient travel time to the health facility by health sub-sector (Table III.2) his conclusion could be different. In isolation Table III.2 would suggest that there is a negative relationship between travel time to the facility and utilization. For example, the private sector, which has the lowest travel time, has the highest utilization. By looking at both tables simultaneously, the researcher could conclude that both price and travel time have a negative effect on utilization and that the private sector's travel time was low enough to translate into the highest utilization despite its high price. Of course, the researcher could not say anything about the relative explanatory importance of price and travel time.

Table III.1

Utilization and Average Price
by Subsector
Hypothetical Example

	Subsector			
	Government Subsector	Social Security Subsector	Private Subsector	Total
Utilization	30%	10%	60%	100%
Average Price of a visit ($)	5	2	80	-

Table III.2

Utilization and Average Price
by Subsector
Hypothetical Example

	Subsector			
	Government Subsector	Social Security Subsector	Private Subsector	Total
Utilization	30%	10%	60%	100%
Average Travel Time (minutes)	60	120	20	-

Other interpretations of the above results would be possible and would all be equally arbitrary. The conclusion that one can reach from the above example is that one cannot draw behavioral inferences by looking at the correlation between pairs of variables when other variables, believed to affect the phenomenon studied, are left out of the analysis. Multiple regression techniques allow the researcher to measure the effect that each variable has on the phenomenon being analyzed (e.g., health care demand) while keeping constant, or controlling for, the effect of all the other explanatory variables on the phenomenon.

IV. DESCRIPTIVE RESULTS

Volume II provides descriptive results for curative, obstetric, and preventive care. Since the aim of this report is to study the demand for curative ambulatory care, a summary of basic descriptive results associated with that type of care is provided in Table IV.1.

A total of 2,809 households were randomly selected from the four health areas representing 18,831 people, the average household size being 6.7 individuals. About 670 persons reported having a health problem during the two-week recall period of whom 534 sought curative ambulatory care outside the home and made 1,134 visits. Approximately 35% of all visits took place in pharmacies, 43% in health centers, and 22% in private dispensaries. Around one-fourth of the people who went to a health center also visited a pharmacy (see note (**) at the bottom of the table). People visiting pharmacies and health centers made about 2.0 visits to the facility during the two weeks while those going to private dispensaries made an average of about 2.5 visits. The average patient expenditure during the two weeks was 110 zaires in pharmacies, 330 in health centers, and 209 in private dispensaries. [9] The average travel time to health centers was more than double the travel time to pharmacies and private dispensaries. Health centers' average waiting time was also much greater than that of pharmacies or private dispensaries. The average household income of patients was almost identical among the three groups. [10]

An interesting finding emanating from the above descriptive results is that despite their higher price, travel, and waiting time, health centers captured the largest share of patients. Thus, factors other than prices, travel and waiting times, and income, must explain people's preference

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9. The official exchange rate at the time of the survey (March, 1987) was 180 zaires per us dollar.

10. Additional descriptive information such as frequencies on the above data or information on people's socioeconomic and demographic characteristics can be found in Volume II. Of course, the fact that average income is similar among provider types does not imply that patients' income distribution was uniform or similar among provider group.

Table IV.1

Summary of Descriptive Results
Curative Ambulatory Care

	Type of Provider			
	Only Pharmacy	Health Center (*)	Private Dispensary (**)	Total
(a) Number of Households Selected	-	-	-	2,809
(b) Number of People in Selected Households	-	-	-	18,831
(c) Number of People Who Reported a Health Problem in 2-week Recall	-	-	-	669
(d) Number of People Who Sought Care Outside the home	195	235	103	534
(e) Number of Curative Visits Made by Those in (b)	396	487	251	1134
% of Curative Visits	34.9%	43.0%	22.2%	100.0%
				Weighted Average (***)
(f) Average Expenditure per Illness Episode (zaires of 3/87)	110	330	209	226
(g) Average Travel Time (One Way) to the Provider (minutes)	15	35	17	24
(h) Average Travel Distance (One Way) to the Provider (meters)	500	1,430	700	949
(i) Average Waiting Time for a Visit (minutes)	5	27	9	15
(j) Average Patient's Household Monthly Cash Expenditures (zaires of 3/87)	4,790	4,940	4,720	4,843

Notes:

(*) Includes 55 people who went to both a health center and a pharmacy. The combined average expenditure per illness episode of those people was 514 zaires; their household monthly cash expenditures was 5,000 zaires. Their travel and waiting times were similar to those obtained summing up the travel and waiting times of those going to pharmacy and health center.

(**) Very few people went to both a private dispensary and a pharmacy.

(***) The weight is (b).

for health centers' care. The following chapter explores this and other issues.

V. DETERMINANTS OF HEALTH CARE DEMAND

This chapter provides an analysis of demand determinants by isolating the effect that each explanatory variable has on demand, i.e., on both the decision to seek care outside the home and the decision to choose provider.

The output of the statistical analysis consists of two equations that relate the decisions to seek care and to choose a provider with the variables thought to be demand determinants through a series of numerical coefficients associated with each variable. The resulting equations can be found in Table B.1 of Appendix B.

The remainder of this chapter presents the results of the demand determinants study. The analysis first explores the influence on curative ambulatory care demand of the nature of the health problem and its impact on the person's functional capacity. These are: the interruption of the person's main activity due to ill health; the nature of the main illness symptom; and the self-perception of illness severity. Second, the discussion focuses on the effect of a person's age and gender on demand, by gender group. Third, the presentation centers on the effect of providers' prices on demand by income level. Fourth, the chapter examines the effect on demand of the travel distance between a person's home and the providers' facilities. Finally, the study assesses differences in people's quality of care perceptions of providers. Chapter VI offers an integrated discussion of the results of Chapter V and provides policy recommendations.

A. How to Read the Tables of The Chapter

The straight results of the statistical analysis shown in Appendix B are hard to interpret. In order to facilitate their interpretation, this chapter uses the statistical results to provide several tables which show the influence of each explanatory variable on demand.

To isolate a variable's effect on demand it is necessary to fix, or maintain constant, all the other variables. For example, if one wants to assess to extent to which gender influences demand, one must keep constant the value of all other demand determinants such as education, age, prices, travel and waiting time, income, beneficiary status, etc. By fixing the value of those variables, one can prevent them from contaminating the analysis through their own effect on demand. Throughout the chapter, the value at which all the other variables have been fixed is shown at the bottom of each table.

The following example illustrates how the results provided in the subsequent tables should be interpreted. Table V.1 shows how curative ambulatory care demand varies depending on whether or not the ill person has to interrupt his or her main activity due to the illness. The upper portion of the table shows information for males while the bottom portion does so for females.

The table provides two types of information. First, it shows the probabilities that the person will or will not seek care outside the home depending on whether or not the person's main activity is interrupted (columns (a) and (c), respectively). Column (a) indicates that a male who does not interrupt work due to the illness has a 70.1% probability of seeking care outside the home and a 29.9% (100.0% - 70.1%) probability of not seeking outside care. In contrast, column (c) shows that if that person's main activity is interrupted due to ill health his probability of seeking care outside the home is much higher, or 80.5%, whereas the probability of not seeking care outside the home is much lower, or 19.5% (100.0% - 80.5%).

Second, the table shows the probability that the person will choose a particular provider given that he or she has decided to seek care outside the home. These probabilities are shown in columns (b) and (d). Column (b) indicates that if the person's main activity is not interrupted and he decides to seek outside care, his probability of choosing a pharmacy is 42.6%; a health center 34.9%; a private dispensary 17.4%; and both a pharmacy and a health center 5.1%. The sum of these four probabilities is, of course, 100% since those are the four options that were chosen by the individuals in the sample. Column (d) shows the corresponding probabilities if the person's main activity is interrupted and he seeks care outside the home. These are 46.5% for pharmacy; 34.7% for health center; 9.6% for private dispensary; and 9.2% for both pharmacy and health center. While the probabilities of choosing only a pharmacy or only a health center remain virtually unchanged between columns (b) and (d), the probability of choosing a private dispensary changes in an important way dropping from 17.4% when the main activity is not interrupted to 9.6% when interruption occurs. This decline in private dispensary use is accompanied by an increase in the probability of choosing a combination of pharmacy and health center. A possible interpretation of this result is that those health problems which cause interruption of the person's main activity are relatively severe conditions for which people may seek treatment at the health center and, additionally, purchase in a pharmacy drugs that are not always available at the health center.

Table V.1

Probability of Seeking Curative Ambulatory Care
Outside the Home and of Choosing Provider
as a Function of Gender and Main Activity
Interruption Due to Illness

Gender		Main Activity Interrupted			
		No		Yes	
		Probability of		Probability of	
		Seeking Care	Choosing Provider	Seeking Care	Choosing Provider
		(a)	(b)	(c)	(d)
MALE					
	No medical care	29.9%		19.5%	
	Medical care	70.1%		80.5%	
	Pharmacy		42.6%		46.5%
	Health center (HC)		34.9%		34.7%
	Private dispensary		17.4%		9.6%
	Pharmacy and HC		5.1%		9.2%
FEMALE					
	No medical care	31.5%		21.1%	
	Medical care	68.5%		78.9%	
	Pharmacy		41.8%		47.9%
	Health center (HC)		30.5%		31.8%
	Private dispensary		24.5%		14.2%
	Pharmacy and HC		3.2%		6.0%

ASSUMPTIONS

Bed confinement : no
Fever as main symptom : no
Self-percept.of severity: non sev.

Age : 15-44
Education: 5.5 yrs.
Cash exp.: 4,335 zaires (monthly)

	Pharmacy	Health Center	Private Dispens.	Pharmacy and HC
Price (zaires)	109	330	209	439
Trav.dist.(mtrs)	500	2,459	820	2,959
Wait time (mins)	5	28	4	33

A. Interruption of Main Activity Due to Illness

The effect on demand of main activity interruption due to illness is discussed in the above example. Two important findings emerged: first, the probability of seeking care outside the home increases if the illness causes main activity interruption; second, among those who seek care, those whose main activity is interrupted due to ill health have a much lower probability of choosing a private dispensary and a probability almost twice as large of going to both a health center and a pharmacy. A possible explanation for this behavior was provided above. In addition, the data from Table V.1 suggest that male-female differences in behavior are not important.

B. Fever as the Main Illness Symptom and Self-Perceived Illness Severity

Table V.2 shows, for a male with the characteristics described at the bottom of the table, the separate and combined effect on demand of a person's main illness symptom and self-perception of illness severity. The first finding that emerges from the table is that the presence of a fever as the main illness symptom increases the probability that a person will seek care outside the home. This can be seen when comparing the probabilities from the lower two quadrants with those in the upper quadrants.[11] For example, if a person does not have a fever and assesses his illness as not serious (South-West quadrant of the table), the probability that he will seek care outside the home is 70.1%; if a fever is experienced, that probability increases to 82.0% (North-West quadrant).

With respect to illness severity, it was found that the coefficient associated with the illness severity variable in the decision-to-seek-care equation was not statistically significant (see Table B.1). This may help explain the odd result of Table V.2 which suggests that if a person assesses his or her own condition as being serious the person has a lower probability of seeking care than if he or she considers his illness to be severe. [12] Nevertheless, the self-perception of illness severity appears to have an important and statistically significant effect on the probability of choosing a health center among those who decide to seek care outside the home. For example, a man who seeks outside care without having had a fever and who believes his illness is not serious has a probability of 34.9% of going to a health center. In contrast, if he think his condition is indeed serious his probability of choosing a health center is much higher, or 52.2%. This is an

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[11]. The coefficient associated with the fever variable in the probability to seek care equation is highly significant as can be seen from Table B.1 of Appendix B.

[12]. Provide in footnote the simple correlation coefficient between fever and severity variables.

Table V.2

Probability of Seeking Curative Ambulatory Care
Outside the Home and of Choosing Provider
as a Function of Self-Assessment of Illness
Severity and Presence of Fever as Main Symptom

Fever as Main Symptom	Illness Perceived as Severe			
	No		Yes	
	Probability of		Probability of	
	Seeking Care	Choosing Provider	Seeking Care	Choosing Provider
FEVER				
No medical care				
Medical care	82.0%		76.2%	
Pharmacy		45.0%		25.5%
Health center (HC)		27.3%		41.6%
Private dispensary		18.6%		16.8%
Pharmacy and HC		9.2%		16.1%
NO FEVER				
No medical care	29.9%		37.5%	
Medical care	70.1%		62.5%	
Pharmacy		42.6%		23.7%
Health center (HC)		34.9%		52.2%	
Private dispensary		17.4%		15.4%
Pharmacy and HC		5.1%		8.7%

ASSUMPTIONS

Main activity interrupted: no
Bed confinement : no

Age : 15-44
Gender : male
Education: 5.5 yrs.
Cash exp.: 4,335 zaires (monthly)

	Pharmacy	Health Center	Private Dispens.	Pharmacy and HC
Price (zaires)	109	330	209	439
Trav.dist.(mtrs)	500	2,459	820	2,959
Wait time (mins)	5	28	4	33

14a

important finding which implies that health care provided by health zones through their health centers is perceived by the population as being more appropriate for treating health conditions that are considered to be severe.

C. Age, Gender, and Education

The effect on demand of age group is shown in Table V.3 by gender. Several findings surface from the table. First, infants are the least likely to seek care outside the home. This finding contrasts with those of other studies which have observed that infants constitute the age group most likely to seek care curative ambulatory outside the home in the presence of an illness. This is a alarming finding since children are more likely to die of any given illness than adults.[13] Discussions with health zone medical personnel and epidemiologists should help interpret this result. Second, the probability of seeking care outside the home is rather uniform among the remaining age groups, a finding which also contrasts with other studies.[14] Third, among those who obtain care outside the home, the probability of going only to a health center decreases monotonically with age. For example, male children under the age of 1 have a probability of almost 60% of being brought only to a health center once the decision to seek care has been made. This probability decreases systematically with age to a low of 33.0% for adults over 44. Further, infants constitute the age group with the highest probability of going to the health center either as the sole source of care or in combination with pharmacy care: 67.5% (59.6% + 7.9%) of all infants seeking care are brought to a health center, followed by adults over 44 with 52.7% (33.0% + 19.7%), and children aged 1-4 with 50.9% (47.6% + 3.3%). Fourth, the probability of combining pharmacy and a health center care is highest among adults aged 45 and older. Finally, when compared with males, females appear to be more likely to choose a private dispensary, primarily at the expense of combined health center-pharmacy care. Other behavioral differences among gender groups are not important.

The influence of schooling on demand is shown in Table V.4. In contrast with other studies, the present analysis shows that education does not have an important effect on curative ambulatory care demand. Rather than illustrating a behavioral phenomenon, however, this results

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13. Gertler, Locay, and Sanderson discuss age effects on demand in their 1984 paper for Peru. For results from other countries see Bitran (1989a) for the Dominican Republic and Bitran (1989d) for El Salvador.

14. Children aged 1 through 4 years and adults over 44 account for the largest probabilities of seeking care outside the home as shown in Table V.3. This finding is in line with those of the studies cited above where those two age groups accounted for the second and third probabilities, respectively, after infants. The result which contrasts with other studies is not so much the sequence but rather the uniformity of the probabilities among groups.

Table V.3

Probability of Seeking Curative Ambulatory Care
Outside the Home and of Choosing Provider
as a Function of Gender and Age

Gender		Age (years)									
		Less than 1		1 - 4		5 - 14		15 - 44		Over 44	
		Probability of		Probability of		Probability of		Probability of		Probability of	
		Seeking Care	Choosing Provider	Seeking Care	Choosing Provider	Seeking Care	Choosing Provider	Seeking Care	Choosing Provider	Seeking Care	Choosing Provider
MALE											
	No medical care	40.8%		27.3%		31.4%		29.9%		26.4%	
	Medical care	59.2%		72.7%		68.6%		70.1%		73.6%	
	Pharmacy		19.4%		37.0%		49.1%		42.6%		37.5%
	Health center (HC)		59.6%		47.6%		40.1%		34.9%		33.0%
	Private dispensary		13.2%		12.1%		9.1%		17.4%		9.8%
	Pharmacy and HC		7.9%		3.3%		1.8%		5.1%		19.7%
FEMALE											
	No medical care	43.3%		29.1%		33.3%		31.5%		28.6%	
	Medical care	56.7%		70.9%		66.7%		68.5%		71.4%	
	Pharmacy		20.1%		37.5%		49.6%		41.8%		40.1%
	Health center (HC)		55.1%		42.8%		36.1%		30.5%		31.4%
	Private dispensary		19.6%		17.6%		13.2%		24.5%		15.0%
	Pharmacy and HC		5.2%		2.1%		1.2%		3.2%		13.5%

ASSUMPTIONS

Main activity interrupted: no
Bed confinement : no
Fever as main symptom : no
Self-percept.of severity : non sev.

Education: 5.5 yrs.
Cash exp.: 4,335 zaires (monthly)

	Pharmacy	Health Center	Private Dispens.	Pharmacy and HC
Price (zaires)	109	330	209	439
Trav.dist.(mtrs)	500	2,459	820	2,959
Wait time (mins)	5	28	4	33

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Table V.4

Probability of Seeking Curative Ambulatory Care
Outside the Home and of Choosing Provider
as a Function of Gender and Years of Education (*)

Gender		Education (years) 0		4		5.54 (**)		8		10	
		Probability of Seeking Care	Probability of Choosing Provider	Probability of Seeking Care	Probability of Choosing Provider	Probability of Seeking Care	Probability of Choosing Provider	Probability of Seeking Care	Probability of Choosing Provider	Probability of Seeking Care	Probability of Choosing Provider
MALE											
	No medical care	29.4%		29.7%		29.9%		30.0%		30.2%	
	Medical care	70.6%		70.3%		70.1%		70.0%		69.8%	
	Pharmacy		39.5%		41.8%		42.6%		43.9%		44.9%
	Health center (HC)		36.1%		35.3%		34.9%		34.3%		33.7%
	Private dispensary		20.5%		18.2%		17.4%		16.1%		15.0%
	Pharmacy and HC		3.8%		4.7%		5.1%		5.8%		6.4%
FEMALE											
	No medical care	30.8%		31.3%		31.5%		31.7%		31.9%	
	Medical care	69.2%		68.7%		68.5%		68.3%		68.1%	
	Pharmacy		38.2%		40.8%		41.8%		43.4%		44.6%
	Health center (HC)		31.0%		30.7%		30.5%		30.2%		29.9%
	Private dispensary		28.5%		25.5%		24.5%		22.8%		21.5%
	Pharmacy and HC		2.4%		2.9%		3.2%		3.6%		4.0%

ASSUMPTIONS

Main activity interrupted: no
Bed confinement : no
Fever as main symptom : no
Self-percept.of severity : non sev.

Age : 15-44
Cash exp.: 4,335 zaires (monthly)

	Pharmacy	Health Center	Private Dispens.	Pharmacy and HC
Price (zaires)	109	330	209	439
Trav.dist.(mtrs)	500	2,459	820	2,959
Wait time (mins)	5	28	4	33

(*) For children under 15 the education of the most educated person in the household was considerd.
(**) Sample average

may reflect the fact that schooling in the sample was overall very low and with little variation. Thus, the coefficients associated with the years of education variables came out not statistically significant in the demand equations.

D. Prices

In order to assess the effect of providers' prices on demand, the average patient expenditure per illness episode with a given provider has been varied and its effect on demand has been analyzed while, again, keeping all the other variables constant.

1. Health Center Price

As Shown in Table IV.1, the sample health center average patient expenditure was 330 zaires or about 1.80 US dollars. To study the influence of health center price on demand, the price was varied between 0 and 800 zaires as shown in Table V.5. In order to see whether, and the extent to which, price effects on demand vary according to income, the table provides probability estimates for three household cash expenditure quintiles (lowest, middle, and highest).

Several facts surface from Table V.5. First, variations in the health center price level appear to have an important effect on the probability that a person will seek care outside the home at low price levels but more modest effects as the price rises. For example, a person who belongs to a middle income household has a probability of 86.5% of seeking care outside the home if ill when facing a health center price of zero. That probability drops to 75.3% if the price is 200 zaires and to 70.2% at the observed average price of 330 zaires. Further price increases result in only marginal reductions in the probability of seeking care outside the home. Thus, the statistical results suggest that if the health center price were increased beyond its current level of about 300 zaires, it would reduce only marginally the number of people seeking care outside the home. In contrast, the exercise also implies that health center price reductions below the current price level have the potential of increasing in an important way the proportion of people seeking care outside the home when ill.

Second, while Table V.1 indicates that health center price increases beyond the current price level would deter only minimally people from seeking care outside the home, it also shows that those seeking care would massively shift away from health centers towards other providers. For example, if the current health center price were raised by 21% to 400 zaires, the proportion of people going to the health center among those seeking care would fall from 35.0% for a middle income people to 24.7%, or a 30% drop. Health center price changes have therefore two effects on

Table V.5

Probability of Seeking Curative Ambulatory Care
Outside the Home and of Choosing Provider
as a Function of Health Center Price and
Household Monthly Cash Expenditures

Monthly Cash Expenditure Quintile (March 1988 zaires)	Health Center Price (March 1988 zaires)											
	0		200		330 (*)		400		600		800	
	Probability of		Probability of		Probability of		Probability of		Probability of		Probability of	
	Seeking Care	Choosing Provider	Seeking Care	Choosing Provider	Seeking Care	Choosing Provider	Seeking Care	Choosing Provider	Seeking Care	Choosing Provider	Seeking Care	Choosing Provider
I: 0-2300 ZAIRES												
No medical care	13.5%		25.3%		30.5%		32.2%		34.2%		34.8%	
Medical care	86.5%		74.7%		69.5%		67.8%		65.8%		65.2%	
Pharmacy		4.2%		24.4%		44.2%		52.5%		64.8%		68.4%
Health center (HC)		85.9%		58.9%		33.7%		23.2%		8.1%		3.7%
Private dispensary		1.7%		9.6%		17.4%		20.7%		25.6%		27.0%
Pharmacy and HC		8.2%		7.1%		4.7%		3.5%		1.6%		0.9%
III: 3501-5400 ZAIRES												
No medical care	13.5%		24.7%		29.8%		31.5%		33.6%		34.2%	
Medical care	86.5%		75.3%		70.2%		68.5%		66.4%		65.8%	
Pharmacy		4.4%		23.7%		42.5%		50.7%		63.1%		66.9%
Health center (HC)		85.4%		59.1%		35.0%		24.7%		9.3%		4.6%
Private dispensary		1.8%		9.7%		17.4%		20.7%		25.8%		27.3%
Pharmacy and HC		8.5%		7.4%		5.1%		3.9%		1.9%		1.2%
V: 8701-38000 ZAIRES												
No medical care	13.3%		21.8%		25.8%		27.2%		29.4%		30.1%	
Medical care	86.7%		78.2%		74.2%		72.8%		70.6%		69.9%	
Pharmacy		5.2%		20.2%		33.3%		39.4%		50.4%		54.1%
Health center (HC)		82.1%		60.3%		42.4%		34.2%		19.6%		14.5%
Private dispensary		2.6%		10.1%		16.6%		19.6%		25.1%		26.9%
Pharmacy and HC		10.1%		9.4%		7.7%		6.7%		4.9%		4.6%

ASSUMPTIONS

Main activity interrupted: no
Bed confinement : no
Fever as main symptom : no
Self-percept.of severity : non sev.

Age : 15-44
Gender : male
Education: 5.5 yrs.

	Pharmacy	Health Center	Private Dispens.	Pharmacy and HC
Price (zaires)	109	See table	209	From tabl
Trav.dist.(mtrs)	500	2,459	820	2,959
Wait time (mins)	5	28	4	33

(*) [illegible] average

demand both opposite, in direction, to the price movement: a change in the proportion of people seeking care outside the home and a shift in the proportion of people going to the health center. In Table C.1 of Appendix C these two effects have been combined to compute the elasticity of demand with respect to the health center price. For instance, at the current average price of 330 zaires, the elasticity of demand for health center care with respect to the health center price is -1.69, a strikingly high elasticity when compared with the findings of other studies of health care demand in developing countries. [15] This high price elasticity indicates that if the health center price were reduced from its current level it would bring about a substantial increase in the number of people seeking care from health centers: more people would seek care outside the home when ill and a greater proportion of those seeking care would choose health centers. A price increase, on the other hand, would translate into a sharp reduction in the number of health center patients, as ill people would seek care elsewhere. [16]

Third, through Table V.5 one can compare the influence of price on demand across income groups. The table reveals that, at any given health center price, demand for health center care increases with income. For example, at the current health center price of 330 zaires, 74.2% of the ill who belong to the highest income quintile seek care outside the home and, among those, 42.4% go to a health center. The corresponding figures for people in the lowest income group are much lower: 69.5% and 33.7% respectively. By the same token, although less evident from the table, for any given increase in health center price, demand diversion is lowest among those in the highest income group and vice-versa. For example, if the health center price were increased from 330 zaires to 400 zaires, the proportion of the ill in the highest income quintile going to the health center would drop from 31.5% (74.2% x 42.4%) to 24.9% (72.8% x 34.2%), or a total drop of 21%. In contrast, that same price increase would result in a proportionally much higher demand reduction among the poorest (those in the lowest income quintile), from 23.4% (69.5% x 33.7%) to 15.7% (67.8% x 23.3%), or a total fall of 33%.

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[15]. See, for example, Gertler, Locay, and Sanderson, (1987) for results on Peru, Mwabu (1984) for Kenya, Bitran (1989a) for the Dominican Republic, and Bitran, 1989d for El Salvador. An important factor explaining why the price elasticity is much higher in Zaire is that in that country prices approximate cost of production and are relatively high when compared to people's income. In contrast, prices of government facilities in the countries cited above are heavily subsidized and are therefore much lower relative to people's income. As prices of a good or service increase as a proportion of people's income, so does the price elasticity of demand.

[16]. Over the past three years Zaire has had a steep rate of inflation exceeding 100% annually. The nominal prices of health care and other services and goods as well as people's income have therefore increased constantly (though not all at the same pace). The discussions in the text about increases or cuts in health center of other providers' prices refer to real (i.e., inflation-adjusted) price changes, or changes above or below nominal changes.

Table V.5 can also be used to compare demand between firm employees and their dependents who by law must be given free care and other individuals who must pay full prices. [17] For the sake of the example, consider the individuals in the middle (III) income quintile. Firm beneficiaries who have a health problem seek care in 86.5% of the cases and 85.4% of those seeking care would go to a health center. Thus, 73.5% (86.5% x 85.4%) of the ill would both seek care and go to a health center. In contrast, individuals who are not enterprise beneficiaries and who are ill seek care outside the home with a probability of 70.2% since they face the full health center price of 330 zaires. Among those seeking care, only 35.0% go to the health center. Overall, 24.6% (70.2% x 35.0%) of the non-beneficiaries who are ill seek care and choose the health center. The demand for health center care by the people who are firm beneficiaries is therefore at least 3 times as large (73.5% divided by 24.6%), per 100 people, as that by non-beneficiaries. [18] This coincides with information collected by Dr. Yves Heyligers, former chief medical officer of the health zone of Bokoro, which indicated that, on a per capita basis, enterprise employees and their dependents made over five times as many visits to the health center on an annual basis as the rest of the population.

2. Private Dispensary Price

Table V.6 shows how changes in the price of private dispensaries would affect demand. The results shown in this table are less relevant than those in Table V.5 since policy makers' ability to influence private providers' prices is more limited than in the case of the para-statal health centers. [19] Nevertheless, the findings emerging from Table V.6 for private dispensary prices parallel those obtained in Table V.5 for health centers: price increases above the current level have only a modest impact on the proportion of people seeking care outside the home but a large impact on the choice of provider; at any given price level demand for private dispensary care is higher among those with greater income; and demand responses to price changes are sharper among the poor.

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[17]. By law, health care providers must give care free of direct charge to firm employees and their dependents but are allowed to periodically bill the enterprise for the care given to its beneficiaries. The survey data, however, showed that several enterprise employees made direct payments for the care received.

[18]. In fact their demand is likely to be greater since, in the example, it is assumed that firm beneficiaries face the full price of private dispensaries and pharmacies when in reality they can also get care free of charge from those providers, a reason to expect a higher proportion of the ill seeking care outside the home.

[19]. For the same reason, a table showing the effect on demand of changes in pharmacy prices is not included.

Table V.6

Probability of Seeking Curative Ambulatory Care
Outside the Home and of Choosing Provider
as a Function of Private Dispensary Price and
Household Monthly Cash Expenditures

Monthly Cash Expenditure Quintile (March 1988 zaires)	Private Dispensary Price (March 1988 zaires)											
	0		100		209 (*)		300		400		500	
	Probability of		Probability of		Probability of		Probability of		Probability of		Probability of	
	Seeking Care	Choosing Provider	Seeking Care	Choosing Provider	Seeking Care	Choosing Provider	Seeking Care	Choosing Provider	Seeking Care	Choosing Provider	Seeking Care	Choosing Provider
I: 0-2300 ZAIRES												
No medical care	22.9%		27.8%		30.5%		31.5%		32.0%		32.2%	
Medical care	77.1%		72.2%		69.5%		68.5%		68.0%		67.8%	
Pharmacy		18.2%		32.8%		44.2%		48.9%		51.3%		52.4%
Health center (HC)		13.9%		25.0%		33.7%		37.3%		39.1%		39.9%
Private dispensary		65.9%		38.7%		17.4%		8.5%		4.0%		2.1%
Pharmacy and HC		2.0%		3.5%		4.7%		5.3%		5.5%		5.6%
III: 3501-5400 ZAIRES												
No medical care	22.7%		27.3%		29.8%		30.8%		31.2%		31.4%	
Medical care	77.3%		72.7%		70.2%		69.2%		68.8%		68.6%	
Pharmacy		18.4%		32.1%		42.5%		47.3%		49.4%		50.4%
Health center (HC)		15.2%		26.4%		35.0%		38.9%		40.6%		41.4%
Private dispensary		64.2%		37.7%		17.4%		8.2%		4.0%		2.2%
Pharmacy and HC		2.2%		3.9%		5.1%		5.7%		5.9%		6.1%
V: 8701-38000 ZAIRES												
No medical care	21.2%		24.1%		25.8%		26.4%		26.8%		27.0%	
Medical care	78.8%		75.9%		74.2%		73.6%		73.2%		73.0%	
Pharmacy		18.8%		27.3%		33.3%		36.0%		37.6%		38.4%
Health center (HC)		24.0%		34.8%		42.4%		45.9%		47.9%		48.9%
Private dispensary		52.9%		31.6%		16.6%		9.8%		5.8%		3.8%
Pharmacy and HC		4.4%		6.3%		7.7%		8.3%		8.7%		8.9%

ASSUMPTIONS

Main activity interrupted: no
Bed confinement : no
Fever as main symptom : no
Self-percept.of severity : non sev.

Age : 15-44
Gender : male
Education: 5.5 yrs.

	Pharmacy	Health Center	Private Dispens.	Pharmacy and HC
Price (zaires)	109	330	See table	439
Trav.dist.(mtrs)	500	2,459	820	2,959
Wait time (mins)	5	28	4	33

(*) Sample average.

E. Travel Distance to Health Facilities

The travel time to health facilities is expected to have a negative effect on demand since people generally must interrupt their normal activities while travelling, thereby impacting household utility in a negative way. The activities that are interrupted include household production, time in school, or leisure time, among others. In the absence of monetary prices, travel time has been shown to have equivalent effects on demand as prices. [20]

For technical reasons discussed in Appendix A, travel distance rather that travel time was entered into the demand equation.

Table V.7 shows that while travel distance to a particular provider has a negligible effect on the probability of seeking care outside the home it has a much more important negative impact on the probability of choosing that particular provider. For example, as the health center travel distance increases from 0 to 5 kilometers, the proportion of people seeking care outside the home goes down only marginally from 71.6% to 68.9%. In contrast, the proportion of people going to the health center decreases in rather important way from 42.6% to 27.6%. In other words, those people living 5 kilometers away from the health center are 35% ([42.6%-27.6%]/42.6%) less likely to choose the health center as those who live in the vicinity of that facility. As shown in the table, those people seeking care who are more distant from the health center have a higher probability of choosing a private dispensary or a pharmacy than those living in the proximity of the health center. Similar findings hold for both private dispensaries and pharmacies.

F. Quality Perceptions

In Tables V.1 through V.7 the price, travel distance, waiting time were set at different (current) levels among the three types of facility as shown in the assumptions at the bottom of each table. In several tables it was shown that even when the health center has a higher price, and longer travel distance and waiting time, the demand for health center care among those seeking care is highest. Table V.8 shows what health care demand would be if the three types of facility had the same price, travel distance, and waiting time. As can be seen from the table, the demand for the three facility types would not be the same. [21] The principal reason for the

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[20]. See Dor, Gertler, and van der Gaag, 1987.

[21]. With individual and provider characteristics being the same, the only factors that account for differences in predicted demand for the three types of provider are the coefficients associated with individual characteristics which vary by provider and the different

Table V.7

Probability of Seeking Curative Ambulatory Care
Outside the Home and of Choosing Provider
as a Function of Travel Distance, by Provider Type

Provider Type	Distance (meters)													
	0		1000		2000		2459		3000		4000		5000	
	Probability of		Probability of		Probability of		Probability of		Probability of		Probability of		Probability of	
	Seeking Care	Choosing Provider	Seeking Care	Choosing Provider	Seeking Care	Choosing Provider	Seeking Care	Choosing Provider	Seeking Care	Choosing Provider	Seeking Care	Choosing Provider	Seeking Care	Choosing Provider
HEALTH CENTER														
No medical care	28.4%		29.0%		29.6%		29.9%		30.1%		30.6%		31.1%	
Medical care	71.6%		71.0%		70.4%		70.1%		69.9%		69.4%		68.9%	
Pharmacy		36.4%		38.9%		41.5%		42.6%		43.9%		46.3%		48.6%
Health center (HC)		42.6%		39.4%		36.3%		34.9%		33.3%		30.4%		27.6%
Private dispensary		14.8%		15.9%		16.9%		17.4%		17.9%		18.9%		19.8%
Pharmacy and HC		6.2%		5.8%		5.3%		5.1%		4.9%		4.4%		4.0%
	0		300		600		820		900		1200		1500	
PRIVATE DISPENSARY														
No medical care	29.7%		29.7%		29.8%		29.9%		29.9%		29.9%		30.0%	
Medical care	70.3%		70.3%		70.2%		70.1%		70.1%		70.1%		70.0%	
Pharmacy		41.7%		42.0%		42.4%		42.6%		42.7%		43.0%		43.3%
Health center (HC)		34.2%		34.5%		34.7%		34.9%		35.0%		35.3%		35.5%
Private dispensary		19.1%		18.5%		17.8%		17.4%		17.2%		16.6%		16.0%
Pharmacy and HC		5.0%		5.0%		5.1%		5.1%		5.1%		5.2%		5.2%
	0		250		500		750		1000		1250		1500	
PHARMACY														
No medical care	29.5%		29.7%		29.9%		30.0%		30.2%		30.3%		30.5%	
Medical care	70.5%		70.3%		70.1%		70.0%		69.8%		69.7%		69.5%	
Pharmacy		44.2%		43.4%		42.6%		41.8%		41.0%		40.2%		39.4%
Health center (HC)		33.7%		34.3%		34.9%		35.5%		36.1%		36.7%		37.3%
Private dispensary		16.8%		17.1%		17.4%		17.7%		18.0%		18.3%		18.6%
Pharmacy and HC		5.3%		5.2%		5.1%		5.0%		4.9%		4.8%		4.7%

ASSUMPTIONS

Main activity interrupted: no
Bed confinement : no
Fever as main symptom : no
Self-percept.of severity : non sev.

Age : 15-44
Gender : male
Education: 5.5 yrs.
Cash exp.: 4,335 zaires (monthly)

	Pharmacy	Health Center	Private Dispens.	Pharmacy and HC
Price (zaires)	109	330	see table	439
Trav.dist.(mtrs)	500 or tabl	2,459 or tabl	820 or tabl	2,959 or tabl
Wait time (mins)	5	28	4	33

Table V.8

Probability of Seeking Curative Ambulatory Care
Outside the Home and of Choosing Provider
When Price, Travel, and Waiting Time
Are the Same Across Providers (*)
as a Function of Gender and Age

Gender		Age (years)									
		Less than 1		1 - 4		5 - 14		15 - 44		Over 44	
		Probability of		Probability of		Probability of		Probability of		Probability of	
		Seeking Care	Choosing Provider	Seeking Care	Choosing Provider	Seeking Care	Choosing Provider	Seeking Care	Choosing Provider	Seeking Care	Choosing Provider
MALE											
	No medical care	49.6%		35.2%		41.6%		37.4%		33.7%	
	Medical care	50.4%		64.8%		58.4%		62.6%		66.3%	
	Pharmacy		1.3%		8.0%		12.2%		10.4%		9.4%
	Health center (HC)		91.5%		80.7%		78.3%		75.2%		73.0%
	Private dispensary		3.8%		10.4%		8.9%		11.7%		6.8%
	Pharmacy and HC		3.4%		1.0%		0.6%		2.7%		10.8%
FEMALE											
	No medical care	52.8%		40.1%		46.7%		45.5%		41.6%	
	Medical care	47.2%		59.9%		53.3%		54.5%		58.4%	
	Pharmacy		1.4%		3.3%		5.1%		4.7%		4.2%
	Health center (HC)		90.2%		88.7%		88.1%		80.9%		79.1%
	Private dispensary		6.0%		6.8%		6.0%		12.1%		7.1%
	Pharmacy and HC		2.4%		1.2%		0.8%		2.4%		9.6%

Main activity interrupted: no
Bed confinement : no
Fever as main symptom : no
Self-percept.of severity : non sev.

Education: 5.5 yrs.
Cash exp.: 4,335 zaires (monthly)

ASSUMPTIONS

	Pharmacy	Health Center	Private Dispens.	Pharmacy and HC
Price (zaires)	330	330	330	660
Trav.dist.(mtrs)	2,459	2,459	2,459	4,918
Wait time (mins)	28	28	28	56

(*) Equal to the health center's values (see ASSUMPTIONS)

differences observed in health facility demand is the fact that people's perceptions of the quality of care vary among facilities. In particular, health centers are viewed as being of overwhelmingly higher quality than pharmacies or private dispensaries while the quality of pharmacies is viewed as being inferior. For example, a woman aged 15-44 seeking care would have a probability of 80.9% of choosing only a health center if prices, travel distance, and waiting time were equal among health centers, pharmacies, and private dispensaries. Her probability of choosing a private dispensary would be 12.1% or less that one-sixth the probability of going to a health center while her likelihood of choosing only a pharmacy would be minimal.

Quality perceptions of health facilities' care vary between men and woman and among gender groups. With the exception of the first age group, females show a greater preference for health centers than males. For example, a woman aged 5-14 seeking care would have a probability of 88.1% of going to a health center compared with a smaller probability of 78.3% for a man in the same age group and with the same characteristics (see assumptions at the bottom of the table). Women preference for health center care is due possibly to the fact that most women register at the health center for pre-natal preventive care when pregnant and therefore have stronger ties to the health center than men. Thus, they may have a greater preference for health center care for curative purposes.

It is interesting to note that the perception of health center quality drops systematically with age. Children under the age of one (their parents, of course) show the highest preference for health center care. This is most likely due to the fact that, in the health areas studied, most infants are registered at the health center's pre-school preventive health program and choose the health center as their main source of curative care. [22]

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constant, provider-specific term of the demand equations.

[22]. In the health areas studies, enrollment in pre-school preventive programs among infants was over 70%.

IV. CONCLUSIONS AND RECOMMENDATIONS

This study of curative ambulatory health care demand determinants in four health areas of Zaire has shown that non-price variables such as age, education, and type of health problem affect individual demand in an important way. In particular, it was shown that consumers' perceptions of health care quality vary widely among provider type and have an important effect on demand. For example, the analysis revealed that, if all three provider types had the same price, travel and waiting times as the health centers, over 80% of the people seeking care would choose health centers while private dispensaries and pharmacies would each get only about 10% of all patients. This implies that in the selected areas of Bokoro and Kisantu the network of health centers is perceived by the population as providing services of the highest quality with private providers and pharmacies lagging well behind.

The three types of providers obviously do not have the same prices, waiting and travel time as shown by the survey results. In particular, health centers are the most expensive source of treatment, have the highest waiting time, and are farther away, on the average, from people's home. Despite this, health centers capture considerably more patients that private dispensaries which are facilities that provide the same types of curative services but, as shown by the analysis, of much lower quality.

The study has also found that price is an important determinant of demand for curative ambulatory care. The analysis showed that if health center prices were increased in real terms beyond current levels, demand for health center curative care would drop significantly as people would shift away from health centers toward less expensive sources of care. Conversely, if real health center prices were lowered both overall demand and demand for health center care would increase in an important way.

The importance of prices on demand opens room for debate regarding the appropriate level of prices at the para-statal health centers. Previous studies of health care financing in Zaire have shown that in some health zones curative care prices are set well above direct marginal costs (drugs, other medical supplies, and labor) to pay for both the cost of supervision and other central office costs and for preventive care services which are sold at highly subsidized prices. [23]

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[23]. Each health zone has a central office which, among other activities, provides technical and administrative supervision to zone health centers. Central offices recover supervision costs through fees charged to the health center they supervise. For evidence about the mark-up of curative care prices and the extent to which preventive services are subsidized, see Bitran, 1989b.

Additional external financial assistance in the form of salaries of certain employees, supervision subsidies, and subsidies for the provision of preventive services would permit zone health centers to lower their curative care prices, improve service quality, or both. This, in turn, would result in higher demand for curative services as more people would seek care when ill or injured and a higher proportion of them would go to health centers.

From a public policy viewpoint, however, external subsidies may be viewed as inappropriate since it can be argued that the benefits of both curative and preventive care accrue to the people in the zones and not to the country as a whole. On the other hand, one can assert that the provision of health services by the government of Zaire is highly regressive: most of the government money allocated to health care goes to large secondary and tertiary hospitals located in urban settings benefitting users who have much higher income levels than rural dwellers.[24]

A study of this nature cannot recommend what the appropriate level of government financial assistance to the health zones should be. Further, the study uses data from selected areas from two out of 306 health zones that exist in the country. Its findings, therefore, cannot be extrapolated to the country as a whole. Nevertheless, the study has shown that lower health center prices or improved health center quality of care would have a large effect on curative care use and, presumably, on people's well being. Appropriately targeted and responsibly managed government financial assistance could make a great difference in the selected health areas.

Additional studies could be conducted to assess the extent to which the situation of other health zones resembles that of Kisantu and Bokoro. Such studies would not have to involve the use of expensive methods of data analysis but could collect basic information about the population's socioeconomic characteristics, availability of health care providers, price levels, and utilization levels.

Such studies, if deemed necessary, should not be delayed nor should be a decision by the government regarding whether and the extent to which additional funds should be made available on a continuing basis for supporting some of the health zones' recurrent costs. This study suggests that the social cost of the government's indifference may be extremely high.

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[24]. See Bitran, 1989b.

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APPENDIX A

This Appendix provides a detailed description of the behavioral model used in the study as well as the statistical estimation techniques.

Behavioral Model

The behavioral model used in this study follows closely that developed by Gertler, Locay and Sanderson (1987). It is assumed that individuals derive utility from their health status and from the consumption of non-health goods and services. Individuals' health status is negatively affected by illnesses or injuries. Individuals with a health problem must decide whether or not to purchase health care. If purchased, the ability of individuals to transform health care into an improved health status depends on many factors such as the persons's age, sex, education, and type of health problem.

In order to obtain health care services people have to incur both monetary and non-monetary costs. Monetary costs are the out-of-pocket payments made to the provider and the payments made for transportation to the health care facility. Non-monetary costs are the time spent by individuals traveling to and from the provider's facility and the time spent waiting at the facility.

Out-of-pocket costs affect people's utility since they reduce the amount of income available to purchase non-health goods and services. Time costs also affect utility negatively since they reduce a person's time available for leisure or for other income-producing activities.

More formally, let us denote by U_{ij} the utility obtained by individual i when consuming provider's j health services given that the individual has a health problem. Let H_{ij} be an individual's expected health status after receiving care, R_{ij} the goods and services consumed by person i after paying provider j, and T_{ij} the time spent by individual i when obtaining care from provider j.

Thus:

$$U_{ij} = U (H_{ij}, R_{ij}, T_{ij}) \qquad (1)$$

Individuals are assumed to have limited monetary resources. Their total expenditures on health and non-health goods and services must not exceed available income. Let Y_i' be income available to individual i, P_{ij}' the price that individual i must pay provider j per unit of health

care, M_{ij} the quantity of health care services purchased, W the unit price of a composite of non-health goods and services, and R_{ij} the amount of these goods and services consumed by individual i. The following budget constraint must hold:

$$Y_i' = P_{ij}' \cdot M_{ij} + W \cdot R_{ij} \qquad (2)$$

An individual with a health problem must choose provider j and the amount of medical care M_{ij} which will maximize utility as specified in (1) subject to the budget constraint in (2).

In order to simplify the model, it is assumed that the quantity of care to be consumed (M_{ij}) is determined by the provider and unknown at the time of the first visit. Further, it is assumed that the quantity of care that patients expect to obtain is fixed across providers and close to one (visit). In order to simplify the notation one can normalize the budget constraints in prices using as denominator the price of non-health goods and services.

Thus, (2) becomes

$$Y_i = P_{ij} + R_{ij} \qquad (3)$$

where $P_{ij} = P_{ij}'/W$ and $Y_i = Y_i'/W$.

It is important to point out that this model allows for price discrimination on the part of the provider. In other words, a provider who produces a homogeneous health service may charge different prices to different individuals.

If the quantity of medical care were an endogenous variable, individuals with a health problem would face two decisions: which provider to choose, and how much care to obtain from the chosen provider, given its price and time costs. However, since the amount of care has been assumed to be approximately equal to one, ill people must only decide from which provider to obtain care.

The substitution of (3) into (1) yields an indirect utility function shown in (4), that relates utility to the person's income, to the prices of goods and services, and to the health status and leisure time.

$$V_{ij} = V_{ij}\,(H_{ij}, Y_i - P_{ij}, T_{ij}) \qquad (4)$$

As in Gertler et al. (1987), quality of health care can be defined by establishing a relationship between a person's health status before obtaining care, H_{io}, and after getting care

from provider j, H_{ij}. For example, quality can be defined as the difference between health status after and before treatment

$$Q_{ij} = H_{ij} - H_{io} \tag{5}$$

Solving for H_{ij} in (5), one can obtain a relationship between after-treatment health status, pre-treatment health status, and quality of care.

$$H_{ij} = H_{io} + Q_{ij} \tag{6}$$

Health care quality, Q_{ij}, is assumed to be a function of individual's and provider's characteristics. Thus,

$$Q_{ij} = Q_{ij}\,(X_i, Z_j) \tag{7}$$

where X_i and Z_j denote individual and provider characteristics, respectively. Expression (6) can therefore be re-written as follows:

$$H_{ij} = H_{io} + Q_{ij}(X_i, Z_j) \tag{8}$$

Substituting for H_{ij}, as defined in (8), into (4), above, and after completing the specification, one obtains an expression for individuals' indirect utility which can be tested empirically.

Empirical Specification

An indirect utility function quadratic in consumption was used in the empirical analysis.

$$V_{ij} = H_{ij} + a\cdot(Y_i - P_{ij}) + b\cdot(Y_i - P_{ij})^2 + c\cdot T_{ij} + e_{ij} \tag{9}$$

where e_{ij} represents a random error and accounts for unobserved explanatory variables. Substituting for H_{ij} from (8) into (9) one gets the following expression for individuals' utility:

$$V_{ij} = H_{io} + Q_{ij}(X_i, Z_j) + a(Y_i - P_{ij}) + b\cdot(Y_i - P_{ij})^2 + c\cdot T_{ij} + e_{ij} \tag{10}$$

Individuals with a health problem choose the provider from which they can obtain the highest utility. Since a person's income and pre-treatment health status do not vary by provider, expression (10) reduces to

$$V_{ij} = Q_{ij}(X_i,Z_j) + a \cdot P_{ij} - 2b \cdot Y_i \cdot P_{ij} + b \cdot P_{ij}^2 + c \cdot T_{ij} + e_{ij} \qquad (11)$$

Finally, if we let quality be a linear function of individual and provider characteristics, expression (11) becomes:

$$V_{ij} = a \cdot P_{ij} + b \cdot (P_{ij}^2 - 2Y_i \cdot P_{ij}) + c \cdot T_{ij} + D_i \cdot X_i + E_j \cdot Z_j + e_{ij} \qquad (12)$$

where D_i and E_j are vectors of parameters and X_i and Z_j are vectors of individual an provider attributes, respectively.

Estimation

People with a health problem face two types of decisions. First, they must decide whether or not to seek care. Second, conditional upon seeking care, they must decide from which provider to seek care. The two-step decision-making process can be estimated using nested logit (MacFadden, 1981). Nested logit does not suffer from the independence from irrelevant alternatives (IIA) problem and is a more general formulation of McFadden's conditional logit.

Nested logit can be estimated using full information maximum likelihood. However, the likelihood function is highly non linear, and programming a maximization algorithm can be a difficult and time-consuming process.

An alternative to the full information maximum likelihood method is a two-step procedure. The disadvantage of FIML over the two-step procedure is that any misspecification at one stage also contaminates the estimated parameters at the other stage. The distributional assumptions of the error term are also stronger for FIML than for the two-step procedure.

Two-step estimation is done as follows: In the first step, only those individuals who sought care are considered in order to estimate the parameters of expression (12). Using the estimated parameters, the "inclusive value" is calculated, which represents an exponentially weighted sum of the utilities that could be obtained from each alternative provider. In the second step, the inclusive value is used as an additional variable in the indirect utility expression.

It must be noted that V_{ij} in (12) is unobserved. What is actually observed is the decision made by people, i.e., the provider chosen. Thus, the dependent variable is a dichotomous variable which takes on two values contingent upon the choice made. Traditionally, dichotomous variables are arbitrarily labelled 1 and 0, the former value being used it the choice is made and the later if not. Of course, any other labelling is equally valid. The independent variables are those specified on the right-hand side of equation (12).

As explained in Chapter III, the focus of this analysis is individual's choice of provider type. In principle, each person who is ill can obtain care from any provider type: pharmacies (F), health centers (H), or private dispensaries (P). Using the nested logit formulation, the probability that an individual who decides to seek care chooses subsector j is given by the expression

$$Pj = \frac{e^{Cj.d/(1-g)}}{e^{C_F.d/(1-g)} + e^{C_H.d/(1-g)} + e^{C_P.d/(1-g)}} \qquad (13)$$

where g is the correlation coefficient among the error terms of the indirect utility functions associated with each alternative, d is a vector containing the parameters (a,b,c,D_i,E_j) specified in expression (12), above, C is a vector containing the independent variables $(P_{ij},P^2_{ij}-2Y_i \cdot P_{ij},T_{ij},X_i,Z_j)$ of expression (12), and the subindices F, H, and P denote the three provider types.

Expression (13) can be used to compute the probability of choosing a pharmacy (j=F). In that case, the numerator in (13) would be $e^{c_F \cdot d/(1-g)}$. Similar expressions can be used to compute the probability of choosing a health center (j=H) or a private dispensary (j=P). Note that the denominator in all three expressions is the same.

The product of probability expressions as specified in (13) constitutes the likelihood function whose maximization yields the estimated vector of parameters d/(1-g). The inclusive value for F, H, and P is defined as follows:

$$S_{FHP} = \ln (e^{C_F.d/(1-g)} + e^{C_H.d/(1-g)} + e^{C_P.d/(1-g)}) \qquad (14)$$

where ln denotes natural logarithm.

Once the inclusive value has been calculated, probability expressions for the CARE/NO CARE options are defined as follows:

$$\text{Prob}_{\text{NO CARE}} = \frac{e^{C_N.h}}{e^{C_N.h} + e^{S.(1-g)}} \qquad (15)$$

and

$$\text{Prob}_{\text{CARE}} = \frac{e^{S.(1-g)}}{e^{C_N.h} + e^{S.(1-g)}} \tag{16}$$

where Prob denotes probability, S is the inclusive value of expression (14), C_N is the vector of variables characterizing the NO CARE alternative, and h is the corresponding vector of parameters.

In summary, the parameters d/(1-g) are calculated in the first step and used to compute the inclusive value. These parameters show how individual and provider characteristics influence the choice of subsector once the decision to seek care has been made. In the second step, the inclusive value is used as a variable characterizing the CARE option in order to estimate the vector of parameters h.

After estimation, probability calculations can be done by solving the following system of equations:

$$\frac{\text{Prob}_{\text{NO CARE}}}{\text{Prob}_{\text{CARE}}} = \frac{e^{C_N.h}}{e^{S.(1-g)}} = k1 \tag{17}$$

$$\frac{\text{Prob}_F}{\text{Prob}_H} = e^{(C_F-C_H).d/(1-g)} = k2 \tag{18}$$

$$\frac{\text{Prob}_F}{\text{Prob}_P} = e^{(C_F-C_P).d/(1-g)} = k3 \tag{19}$$

$$\text{Prob}_{\text{NO CARE}} + \text{Prob}_F + \text{Prob}_H + \text{Prob}_P = 1 \tag{20}$$

Equations (17) through (20) constitute a system of four equations with unknowns $Prob_{NO\ CARE}$, $Prob_F$, $Prob_H$, and $Prob_P$.

Solving for these four unknowns one obtains the following recursive solution for probability expressions:

$$Prob_H = \frac{1}{(1+k1).(1+k2+k2/k3)} \tag{21}$$

$$Prob_F = k2.Prob_F \tag{22}$$

$$Prob_P = (k2/k3).P_H \tag{23}$$

$$Prob_{NO\ CARE} = k1.(Prob_F + Prob_H + Prob_P) \tag{24}$$

Hedonic Price and Travel Time Equations

An individual who has a health problem and who decides to seek care faces three choices: to go to pharmacies, health center, or private dispensaries. Each choice is characterized by a price, travel, and waiting time. Individuals make the subsector choice based on the ex-ante expected price, travel and waiting times. For estimation purposes, it is necessary to impute a price, a travel, and a waiting time to each of the three options faced by people with a health problem. Unfortunately, the only information available is the ex-post price actually paid to the provider in the subsector chosen, the distance actually travelled, and the actual time spent waiting in the facility.

A price, a travel time, and a waiting time are imputed to each of the three options faced by an individual using hedonic predicted values. A hedonic price equation is an equation which has as dependent variable the out-of-pocket price paid by the patient to the provider, and as independent variables those variables which affect the price, such as the insurance status of the patient and the type of medical problem. A hedonic travel time equation has as dependent variable the travel time to the provider's facility, and as independent variables those variables which are presumed to affect travel time, such as the age of the patient and the number of facilities of the corresponding subsector in the patient's neighborhood. A hedonic waiting time equation is similarly defined. Appendix Tables B.2 through B.4 present the results from the hedonic regressions.

Table B.1

Curative Ambulatory Medical Care
Nested Logit Estimated Coefficients and t-Statistics
Choice of Provider and Decision to Seek Care

	Pharmacy		Health Center		Private Dispensary		Decision to Seek Care Outside the Home	
	Coefficient	t-statistic	Coefficient	t-statistic	Coefficient	t-statistic	Coefficient	t-statist
Constant	-2.84	2.74	0.19	0.24	-2.09	2.17	-1.69	3.28
Price	-0.12×10^{-1}	3.52	-0.12×10^{-1}	3.52	-0.12×10^{-1}	3.52	---	---
Price squared	0.54×10^{-1}	1.55	0.54×10^{-1}	1.55	0.54×10^{-1}	1.55	---	---
Price times income	0.10×10^{-2}	1.67	0.10×10^{-2}	1.67	0.10×10^{-2}	1.67	---	---
Travel time	-0.72×10^{-1}	3.78	-0.72×10^{-1}	3.78	-0.72×10^{-1}	3.78	---	---
Waiting time	0.43×10^{-2}	0.38	0.43×10^{-2}	0.38	0.43×10^{-2}	0.38	---	---
Age* < 1	0.26	0.33	1.51	2.02	1.21	1.48	1.06	2.48
1 - 4	1.78	2.44	2.16	3.06	2.00	2.57	0.84	1.87
5 - 14	2.66	3.61	2.58	3.59	2.31	2.91	1.30	2.68
15 - 44	1.48	2.17	1.41	2.37	1.92	2.63	0.77	2.00
Sex* (1=male)	-0.45	1.16	-0.33	0.94	-0.81	1.98	-0.28	1.36
Years of education	-0.38×10^{-1}	0.82	-0.57×10^{-1}	1.27	-0.82×10^{-1}	1.61	-0.18×10^{-1}	0.70
Bed confinement* (1=yes)	-0.42	0.98	-0.52	1.22	0.13	0.27	-0.57×10^{-1}	0.23
Interruption of main activity* (1=no)	-0.50	1.03	-0.59	1.22	-1.18	2.07	-0.82	2.67
Fever as main symptom* (1=yes)	-0.53	1.21	-0.83	1.90	-0.52	1.07	-0.92	4.24
Perception of severity* (1=severe)	1.12	2.64	0.14	0.33	0.66	1.41	-0.11	0.44
Inclusive value	---	---	---	---	---	---	0.44	3.23
Log-likelihood			-599				-330	
Degrees of freedom								

*: Dummy variables.

Table B.2

Curative Ambulatory Medical Care
Hedonic Price Regressions
OLS Estimates

	Pharmacy		Health Center		Private Dispensary	
	Coefficient	t-statistic	Coefficient	t-statistic	Coefficient	t-statistic
Constant	123	5.86	343	9.91	246	4.68
Respiratory illness* (1=yes)	-		-94	2.02	-80	1.72
Malaria or worms* (1=yes)	-		-83	2.53	-23	0.67
Age* < 1	-46	1.33	-	-	-	-
1 - 4	15	0.63	-	-	-	-
5 - 14	-23	1.03	-	-	-	-
15 - 44	-30	1.41	-	-	-	-
14 or less	-	-	-38	1.25	-92	2.56
Sex (*) (1=male)	-14	0.96	5	0.16	3	0.08
Kikonka* (1=Kikonka)	11	0.44	148	3.66	44	0.82
Kipako* (1=Kipako)	48	2.55	66	1.62	64	1.19
Tolo* (1=Tolo)	9	0.52	17	0.39	50	1.05
Employee of government or private enterprise* (1=yes)	-	-	-47	0.99	46	0.75
Adjusted r-squared	0.0		0.1		0.1	
n	190		208		97	

*: Dummy variables.

Table B.3

Curative Ambulatory Medical Care
Travel Distance Regressions
OLS Estimates

	Pharmacy		Health Center		Private Dispensary	
	Coefficient	t-statistic	Coefficient	t-statistic	Coefficient	t-statistic
Constant			-28	0.05	2511	8.18
Respiratory illness* (1=yes)			-313	1.28	-80	1.72
Malaria or worms* (1=yes)			-251	1.34	-307	1.52
Age* < 1			-112	0.39	433	1.44
1 - 4			-92	0.39	570	2.01
5 - 14			116	0.47	536	1.83
15 - 44			228	0.96	292	1.00
14 or less			-	-	-	-
Sex (*) (1=male)			233	1.56	-141	0.94
Health center is within 1 kilometer* (1=yes)	-	-	714	1.42	-	-
Health center is between 1 and 2 kilometers* (1=yes)	-	-	746	4.70	-	-
Health center is between 2 and 3 kilometers* (1=yes)	-	-	1,619	1.98	-	-
Health center is between 3 and 5 kilometers* (1=yes)	-	-	6,832	15.33	-	-
There is at least one private provider within 1 kilometer* (1=yes)	-	-			-2282	9.44
Adjusted r-squared			0.8		0.5	
n			229		100	

*: Dummy variables.

Table C.1

Price Elasticities of Demand for Health Center Care and Demand for Private Dispensary Care With Respect to Health Center Price by Price Levels

Private Dispensary Price		Health Center Price: 0	200	330	400	600
0	e_{HH}	0.00	-1.21	-2.17	-2.52	-2.80
	e_{PH}	0.00	0.63	0.39	0.27	0.09
100	e_{HH}	0.00	-0.93	-1.90	-2.31	-2.72
	e_{PH}	0.00	0.92	0.67	0.49	0.18
209	e_{HH}	0.00	-0.77	-1.69	-2.13	-2.64
	e_{PH}	0.00	1.08	0.88	0.67	0.26
300	e_{HH}	0.00	-0.71	-1.61	-2.05	-2.60
	e_{PH}	0.00	1.14	0.96	0.76	0.30

e_{HH} = Price elasticity of demand for health center care with respect to health center price.

e_{PH} = Price elasticity of demand for private dispensary care with respect to health center price.