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Analysis of the Demand for Inpatient and Outpatient Care from Imbaba Hospital, Cairo, Egypt

by

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ABSTRACT

The authors use an econometric analysis of household data to determine the impact of changing fee structures for cost recovery at Imbaba Hospital, a public hospital in Cairo, Egypt. Their analysis includes a description of present health care utilization patterns, estimations of the determinants of demand, and simulations of changes in demand in response to changes in certain key variables. The analysis, conducted separately for inpatients and outpatients, shows that Imbaba Hospital is considered to be a low-quality facility and that demand for inpatient care is less responsive to fee levels than demand for outpatient care. While the authors find that there is a significant willingness to pay for services perceived to be of higher quality, they caution that the results do not provide a clear indication of the potential demand response to increasing fees at Imbaba Hospital.

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EXECUTIVE SUMMARY

BACKGROUND

The Egypt Cost Recovery for Health Project (CRHP), sponsored by the Egyptian Ministry of Health and supported by USAID, is designed to improve the health care system in Egypt. The specific areas addressed by the project are improvements in the quality of services provided, increasing the degree of financial self sufficiency of hospitals, and ensuring adequate access to care for all.

The first phase involves changing fee structures to improve cost recovery at public hospitals, and the first hospital to be considered is Imbaba Hospital, in Cairo. To gain a better understanding of how to modify the current fee system, USAID/Cairo contracted with the Health Financing and Sustainability Project (HFS) and contracted with Integrated Development Consultants of Cairo to conduct three surveys: a household survey, an Imbaba patient survey, and a facility survey. A descriptive analysis of the survey results is contained in "Economic Surveys for Health Financing and Sustainability" by Kemprecos and Oldham (1992).

ANALYTICAL APPROACH

This report presents an econometric analysis based primarily upon the household survey results. The analysis highlights the factors that influence the demand for health services, the expected demand response to a variety of fee changes, and the implications of the results for health policymakers. The analytical method, as well as the findings in this report, are divided into three categories: a descriptive analysis of current patterns of health care utilization, estimation of results from a multivariate analysis on the determinants of health care demand, and simulations of demand response to changes in the key variables of interest. Policy conclusions based upon each of these approaches are spread throughout the report.

The multivariate results are found by estimating multi-stage models of the demand for health care, which attempt to measure the importance of each of a number of variables on an individual's decision to seek care and choice of provider. The models use three groups of variables: household level, such as income, family size, and geographic location; individual level, including gender, age , education level, and employment status; and facility level, including price, quality, and distance from home. For the purpose of this study, providers were grouped into three categories: Imbaba, other public providers, and private/charitable providers. This grouping was chosen based on expected similarities among the various facility types. The analysis was conducted separately for inpatients and outpatients.

It should be noted that most of the multivariate model results are highly sensitive to the model specification, and often performed poorly in a statistical sense. The final model used for simulations was not the preferred specification. The poor behavior of the multivariate model is almost certainly due to the lack

of adequate measures of facility quality. Because of this poor performance, we have minimized the policy conclusions to be drawn from the multivariate model, and emphasized conclusions from the descriptive results and from those multivariate results that are not sensitive to the model specification.

PATTERNS OF HEALTH CARE UTILIZATION

General Analysis

- People in the catchment area are moderately affluent and a large proportion own such items as television sets and tape recorders.
- 20 percent of the households report having at least one family member with health insurance.
- The percentage of average annual household expenditure spent on medical services, including both outpatient and inpatient treatment, ranges from 3.8 percent for the lowest expenditure quintile to just over two percent for the highest quintile.

Outpatient Analysis

- Private providers are the preferred group for outpatient care, with 71 percent of total visits to private or charitable providers.
- Internal medicine and pediatrics are the most commonly needed types of outpatient care.
- Patients at Imbaba are generally less wealthy and less well educated than outpatients at other facilities.
- Patients at Imbaba spend less, on average, than outpatients at other facilities for almost every type of service.

Inpatient Analysis

- Public hospitals are the most popular facilities for inpatient care and, of them, Imbaba is the most often visited, accounting for 16.3 percent of the total hospital visits.
- General surgery is the most common inpatient procedure cited, followed by delivery.
- Patients at Imbaba are predominantly female and slightly younger than other inpatients. Again, they are also less wealthy and less well educated than patients at other facilities.
- Treatment costs at Imbaba are lower than at other facilities for most types of services.

DETERMINANTS OF THE DEMAND FOR HEALTH CARE

Demographic variables such as income, education, employment status, gender, and age are found to be very important determinants of health care demand for both outpatients and inpatients. The outpatient model reveals demographic factors to be more important for an individual's decision to report an illness than for the decision to seek formal care. On the inpatient side, the same demographic variables are also found to have a strong influence on an individual's decision to seek hospital care.

For the choice of facility, factors such as income, price, health insurance, and type of illness are found to have a substantial influence. It is surprising that travel time and quality are not more important, however, this could be the result of the relatively poor measures used for these variables. It seems clear from the pattern of utilization by expenditure quintile, however, that Imbaba is considered to be of low quality. The negative coefficients on income indicate that those individuals who can afford care at private hospitals would prefer to go there. Higher-income individuals are much less likely to visit Imbaba.

POLICY IMPLICATIONS

- There is a significant willingness to pay for private and charitable facilities due to the higher quality of services they are perceived as providing. These private and charitable facilities receive higher scores on a variety of dimensions such as reputation, equipment, cleanliness, and drug availability.

- The Ministry of Health should work to improve the quality of services provided at Imbaba. Perhaps it could specialize, using resources from other areas to improve delivery of the more popular services. (Opening the new building may be a good first step)

- Results from the household survey do not provide a clear indication of the demand response that can be expected from raising fees at Imbaba, since higher fee levels are currently linked with higher average quality. There is some evidence in the data, supported by other studies, that the demand for inpatient care is much less responsive to fee levels than the demand for outpatient services. Given the higher level of resources used in inpatient care, it is appropriate that a new fee structure continue to charge substantially more for inpatient than outpatient services.

- Fee increases could be used to help finance the quality improvements, but caution needs to be taken that lower-income patients, who tend to frequent Imbaba, are not excluded from care. Lower-income individuals already consume substantially fewer health services than higher-income individuals.

- Much of the current revenue is generated from bed charges for inpatient visits. Since wealthy people seem willing to pay high rates for a perceived high quality of care, it may be useful to

scale accommodations in such a way that the desired amenities can be offered to patients at a higher price, but the option for basic low-cost care is still available.

- Insurance, education, and income all have a large impact on the level of health services used. Government policies that influence these variables will also have a significant impact on the use of services at Imbaba.

EXHIBIT 1: LIST OF VARIABLES

INDIVIDUAL LEVEL VARIABLES

		Type of Variable: D = Dummy C = Continuous
Age:		
agegp1	= under 6 years old	D
agegp2	= 6 to 15 years old	D
agegp3	= 16 to 35 years old	D
agegp4	= 36 to 55 years old	D
ageimb	= age of Imbaba patient	C
youth	= person under 12 years old	D
Gender:		
male	=male	D
female	=female	D
Occupation:		
working	= currently working	D
muwazzaf	= low level clerk	D
skilled	= skilled worker	D
unskill	= unskilled worker	D
profess	= professional	D
Education:		
currents	= currently a student	D
primary	= primary education level	D
second	= high school education level	D
college	= college education	D

Reasons for Visit: (dummies for facility groups were interacted with dummies for major reason for visits: 1=Imbaba, 2=Other Public, 3=Private is the omitted dummy)

intmedi	= internal medicine (im1, im2)	D
ent	= ear, nose, throat (ent1, ent2)	D
obgyn	= gynecological (obg1, obg2)	D
pediat	= pediatrics (ped1, ped2)	D
gensurg	= general surgery (gensurg1, gensurg2)	D
matern	= maternity (matern1, matern2)	D

HOUSEHOLD LEVEL VARIABLES

		Type of Variable: D = Dummy C = Continuous
General:		
lnpredex	= log of predicted annual expenditure	C
healthin	= if anyone in the household has health insurance	D

nind	= number of individuals in the household	C
smallfam	= 4 or fewer people in the household	D
medfam	= 5 to 8 people in the household	D

Relationship to head of household:

head	= head of household	D
spouse	= spouse of head of household	D
child	= child of head of household	D
headsex	= gender of head of household	D
headocc	= occupation of head of household	D

Age of Household Head:

hagegp3	= head of household is 16 to 35 years old	D
hagegp4	= head of household is 36 to 55 years old	D

Education of Household Head:

hcurrent	= head is currently a student	D
hprimary	= primary education level for head	D
hsecond	= high school education level for head	D
hcollege	= college education for head	D

Segment of Residence:

emunira	= East Munira	D
geziret	= Geziret Meet Uqba	D
meetuqba	= Meet Uqba	D
mataar	= Mataar Imbaba	D
abdelnia	= Abd El Niam	D
tajeldu	= Taj El Duwal	D
elarab	= Warraq El Arab	D
elhadar	= Warraq El Hadar	D
wmunira	= West Munira	D

FACILITY LEVEL VARIABLES

popfee	= predicted outpatient fee	C
pipfee	= predicted inpatient fee	C
qpoints	= quality rating	C
travti	= estimated travel time	C
oplndenk	= inclusive value from last stage of outpatient model	C
iplndens	= inclusive value from last stage of inpatient model	C

The following are indexed by facility type:
1=Imbaba, 2=Other Public, 3=Private

primedl	= primary education interacted with Imbaba dummy	D
secedl	= secondary education interacted with Imbaba dummy	D
colledl	= college education interacted with Imbaba dummy	D
ageimbl	= patient age interacted with Imbaba dummy	C

1.0 INTRODUCTION

The Egypt Cost Recovery for Health Project is intended to assess the potential for changing fee structures and improving quality at public hospitals to improve their financial position and their delivery of services. The pilot hospital for the analysis is Imbaba Hospital, in Cairo, and, as part of the project, household, patient, and provider surveys of the region surrounding Imbaba were conducted in early 1992. The surveys were conducted by Integrated Development Consultants, and the results are summarized in the Final Report for "Economic Surveys for Health Financing and Sustainability", prepared by Kemprecos and Oldham (1992). Complementary to their analysis, this report presents an econometric analysis of the survey results in an effort to better understand people's willingness to trade price for quality and the extent to which price increases will reduce the utilization of Imbaba Hospital.

Section 2.0 of this report examines and summarizes survey responses, primarily from the household survey, in order to understand expenditure and health care utilization patterns of those residing in the catchment area. This descriptive analysis imparts background information on the current situation and highlights the differences between Imbaba and other types of facilities. The characteristics of Imbaba patients are found to be distinct from patients both in other public and in private/charitable facilities.

In order to predict the independent impact of demographic and facility characteristics while controlling for other variables, a multivariate model of the decision-making process is developed and estimated. The estimation techniques used are three-stage nested logit models of both inpatient and outpatient care. In Section 3.0, the two decision models are estimated and the results discussed. Throughout the analysis, results are compared and facility choices made between three facility groupings: Imbaba, other public, and private/charitable. In the last section, information obtained from the results of the models, regarding which factors influence people's decisions at each stage, is used to examine the likely impact of changes in the fee structures and in the health insurance situations. The focus of these simulations is on changes in the probability of an individual visiting Imbaba for care as, first, the cost of care at Imbaba rises and, second, people in the community go from a position of no insurance to universal coverage. Finally, the results of this analysis are synthesized, and policy recommendations are discussed based on these findings.

2.0 DESCRIPTIVE ANALYSIS

This section presents results from a univariate analysis of the variables concerning expenditure, health care utilization, and patient and facility characteristics. These statistics provide a better understanding of the characteristics of the sample population and their demand for health services. Comparisons of patient characteristics across the different facility groups reveal substantial differences in terms of average costs of services, utilization rates, and the affluence of patients. A complete list of the variables used in this report is found in Exhibit 1.

2.1 SAMPLE

For the purpose of this analysis, the sample was defined such that all the observations have non-missing values for the variables used in the models. The analysis is based on four different units of observation: households, individuals, outpatient episodes, and inpatient episodes. Of the original 1,652 households, our final estimation sample includes 1,647 (99.7 percent). Out of the original sample of 8,012 individuals, our outpatient sample has 7,793 people, of whom 1,810 report having had an illness in the past 30 days, and 2,000 of the original 2,042 outpatient episodes are used. The inpatient model is based on 7,351 people, of whom 510 report being hospitalized at least once during the past year, and 513 of the original 608 inpatient episodes are used. Because of these sample changes, our variable means may differ slightly from those reported by Kemprecos and Oldham (1992).

2.2 INDICATORS OF ABILITY TO PAY

2.2.1 Annual Expenditures

For this analysis, we focused on household expenditure rather than household income as a summary measure of ability to pay. Data on income are particularly useful for assessing the population's ability to pay, however, reliable income figures are rarely available in developing countries. Although the household survey measured both income and expenditure, we have included the figures on annual household expenditure, as estimated by Kemprecos and Oldham (1992), in our analysis.

The household's medical expenditures on outpatient care were calculated as the sum of reported costs of exams, diagnostic tests, drugs, tips, hospital fees, and doctors' fees for all episodes during the 30-day recall period. Expenditures on inpatient care were calculated in a similar manner, based on all episodes during the one-year recall period. For Exhibit 2, annualized spending on outpatient health care is estimated as the monthly outpatient expenditure multiplied by 12. Total annual expenditures are the sum of the annual outpatient and inpatient health expenditures.

Exhibit 2 summarizes total annual expenditure and expenditure on outpatient and inpatient health care services. The annual levels of spending on health services range from approximately US$23 for the second quintile to approximately US$102 for the highest. The resulting percentages of annual expenditure allocated to health care range from 3.86 percent for the lowest quintile to

slightly over two percent for the highest income quintile. The lowest rate of spending is observed for the second income quintile, although the difference between that group and the lowest quintile is not statistically significant.

EXHIBIT 2: MEAN ANNUAL EXPENDITURE AND ANNUAL HEALTH CARE EXPENSES BY EXPENDITURE QUINTILE (LE)

QUINTILE	AVERAGE ANNUAL EXPENDITURE	AVERAGE OUTPATIENT EXPENDITURE	AVERAGE INPATIENT EXPENDITURE	TOTAL %	US $*
LOWEST QUINTILE	2363.7	62.27	28.94	3.86	27.64
SECOND QUINTILE	4042.7	48.41	27.82	1.89	23.10
THIRD QUINTILE	5436.0	67.72	83.11	2.77	45.71
FOURTH QUINTILE	7530.9	131.48	45.34	2.35	53.58
HIGHEST QUINTILE	15986.0	231.16	107.70	2.12	102.69

* Egyptian Pounds (LE) converted to US dollars at a rate of 3.3 LE per US dollar, as in Kemprecos and Oldham (1992).

The data in Exhibit 2 can be used to estimate the "income" elasticity of demand. (Technically, these are expenditure elasticities rather than income elasticities, however, since we are using average annual expenditures as a proxy for income, we choose to present this as the more conventional "income" elasticity.) Income elasticities for outpatient and inpatient care are each approximately .55. These elasticities indicate that a 10 percent increase in expenditures (income) is on average associated with a 5.5 percent increase in spending on both inpatient and outpatient health services. Thus, as expected, health care expenditures generally increase with increases in income.

2.2.2 Asset Ownership

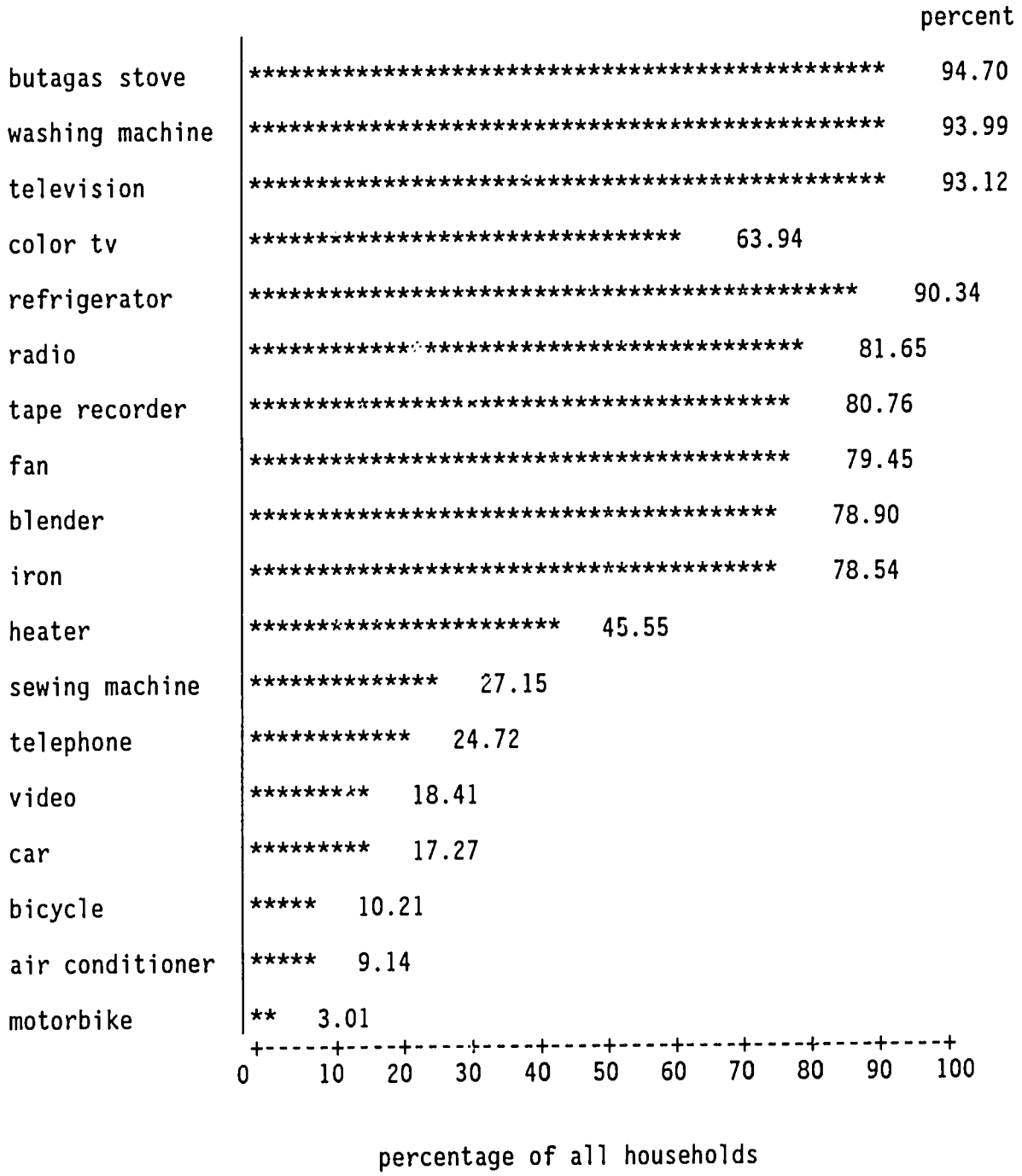
Exhibit 3 shows the percentages of households owning various assets. A striking feature of the sample population is the high rates of ownership of assets commonly associated with moderately high standards of living. Large percentages of people own such items as television sets, tape recorders, refrigerators, and fans. The finding that 93.1 percent of the households own a television set and 63.9 percent own a color television is particularly noteworthy. These percentages more closely resemble those of a fully developed country than those of a developing one. The affluence of the sample suggests that small to moderate increases in health care costs would not cause serious access problems for a substantial portion of the people in the region.

2.2.3 Health Insurance

A further indication of the ability to pay is the presence of health insurance. Approximately 20 percent of the households responded 'yes' to the

question of whether or not any member of their household had health insurance. No doubt many of the people indicating health insurance coverage are covered by the government's mandatory Health Insurance Organization for government and large employers, which has been in place since 1985. In addition to this insurance program, many other people are covered by their employers for treatment by specific providers.

EXHIBIT 3: Percentages of Households Owning Various Assets (self reported)



2.2.4 Willingness to Pay Fees

Exhibit 6 shows the average expense of outpatient treatment for various illnesses at each type of facility. These costs are calculated as averages of patient- reported expenditures; actual facility price quotes were not available. The most notable comparison is between outpatient expenditures at Imbaba and other public hospitals. Patients at Imbaba pay less for every service except dentistry, ophthalmology, and ob/gyn. The average expense for pediatric care is also slightly higher at Imbaba, but the difference is minimal. The differences are quite large for some services. Average expenditures for both internal medicine and orthopedics, for example, are three times higher at other public facilities than at Imbaba. Of the public facilities, Imbaba is visited the most often. Private and charitable facilities are the most expensive, with average patient expenditures five to 10 times higher than at Imbaba. Despite the extreme differences in expenditures between the facility types, Exhibit 4 shows that private and charitable facilities are overwhelmingly preferred for outpatient care, accounting for 71 percent of the total outpatient visits. Presumably these facilities are visited because they offer better quality care. This suggests that a substantial portion of the population may be willing and able to pay much higher prices for care if the perceived quality is higher.

As revealed in Exhibit 7, differences in inpatient expenditures across facilities indicate a similar situation. Extreme variation exists in the average patient expenditure on inpatient care at different facilities, however, some of the observed variation is no doubt due to randomness, probably compounded by the small number of cases in some cells. Inpatients at Imbaba pay less than inpatients at other public hospitals for every service except general surgery, which is only slightly higher, and chest problems. The costs of private and charitable facilities are again much higher for every service. As revealed in Exhibit 5, public facilities are the preferred providers of inpatient care, with Imbaba as the most popular, accounting for 16.3 percent of the episodes. However, 27 percent of the patients still chose private or charitable facilities. In conclusion, the most popular facilities for outpatient care, which is generally less expensive than inpatient care, are private. However, for inpatient procedures, where expense is greater, patients choose public facilities more frequently.

EXHIBIT 4

OUTPATIENT CHOICE OF FACILITY GROUP

BY MAJOR REASON FOR VISIT

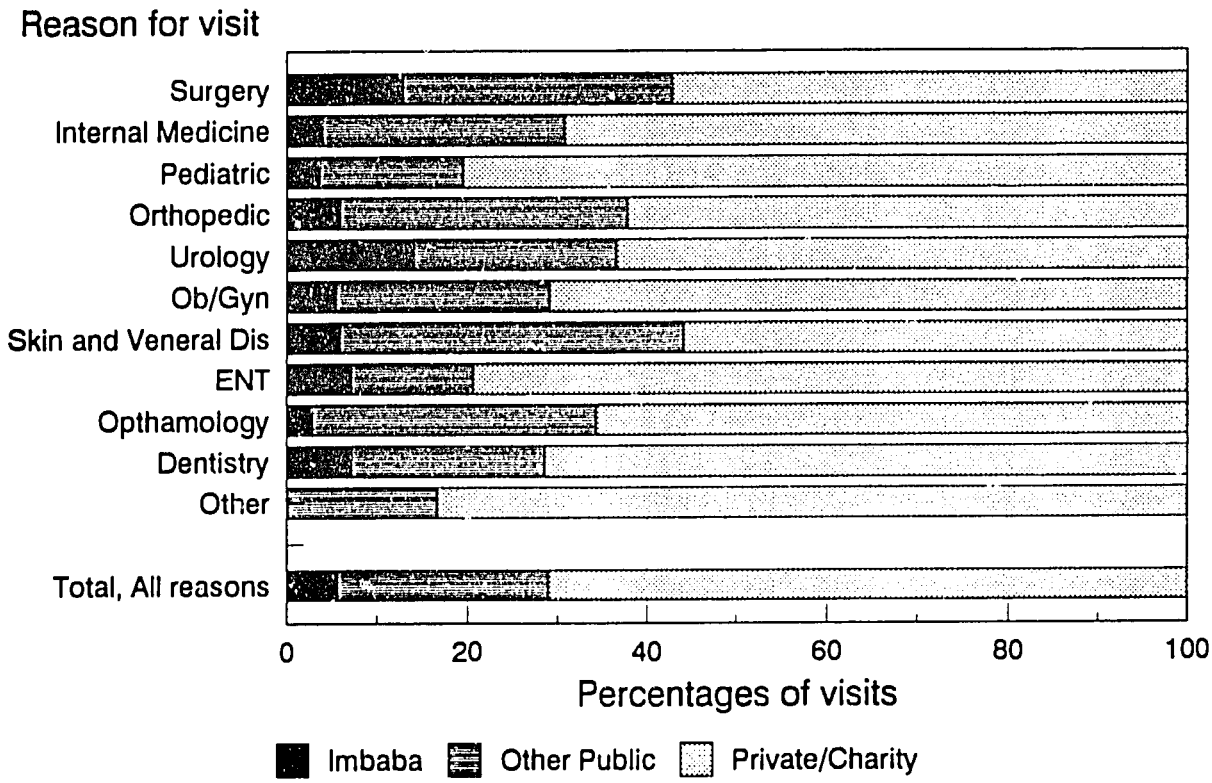


EXHIBIT 5

INPATIENT CHOICE OF FACILITY GROUP

BY MAJOR REASON FOR VISIT

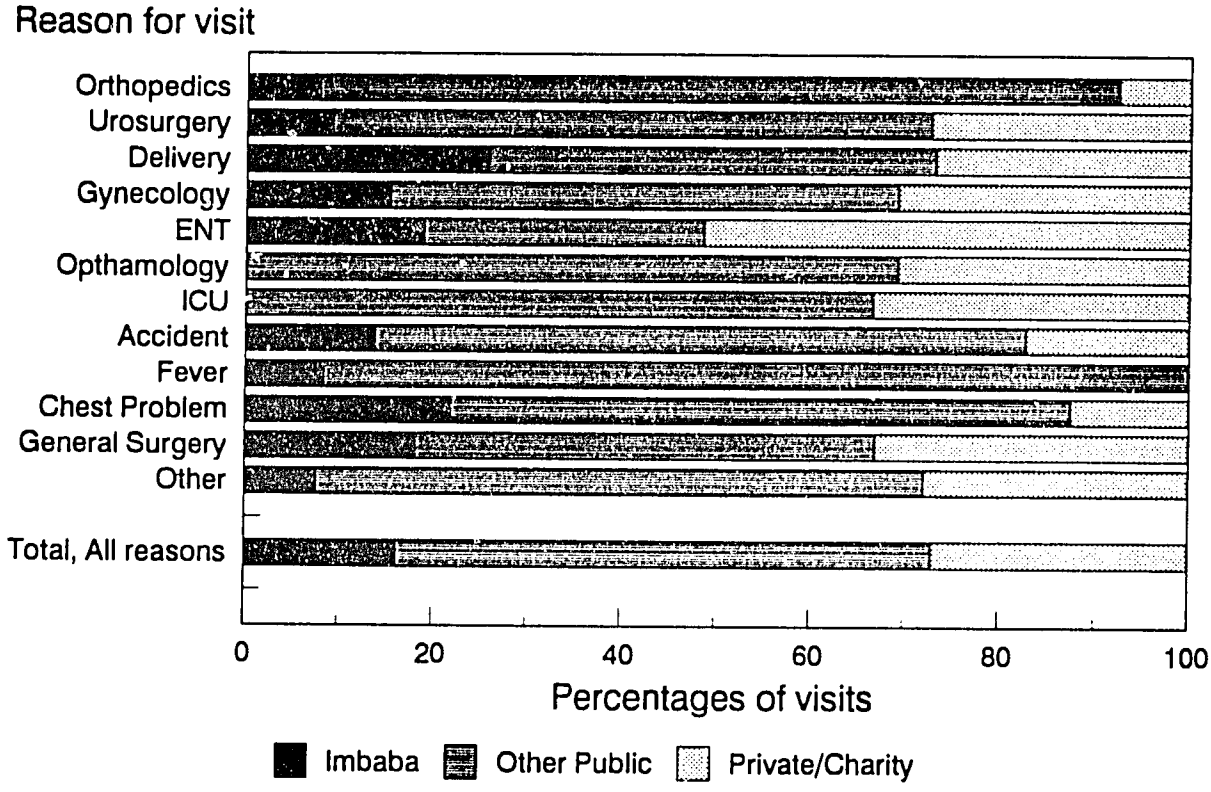


EXHIBIT 6: AVERAGE OUTPATIENT EXPENSES BY FACILITY TYPE AND REASON FOR SEEKING TREATMENT

REASON FOR VISIT	(n)	TOTAL	IMBABA	OTHER PUBLIC	PRIVATE/CHARITY
Internal Medicine	433	31.78	6.99	18.29	38.12
Pediatric	302	17.42	10.05	8.79	19.36
ENT	126	15.07	5.46	14.47	16.05
Orthopedic	119	30.97	12.94	36.03	30.26
Urology	71	29.01	9.72	19.24	36.50
Surgery	70	38.25	12.35	45.20	40.55
Dentistry	56	24.71	2.26	1.69	33.13
OB/GYN	55	22.34	13.33	10.23	26.75
Ophthalmology	35	35.92	11.00	9.66	50.85
Skin and Venereal	34	23.41	4.60	10.46	34.24
Other	6	83.64	****	75.60	85.25
TOTAL	1307	26.32	8.86	19.36	29.91

Note: **** indicates no observations in this cell. This table is based only on those seeking treatment.

EXHIBIT 7: AVERAGE INPATIENT EXPENSES BY FACILITY TYPE AND REASON FOR SEEKING TREATMENT

REASON FOR VISIT	(n)	TOTAL	IMBABA	OTHER PUBLIC	PRIVATE/CHARITY
General Surgery	127	186.73	100.35	92.96	382.58
Delivery	112	148.19	40.37	61.44	431.20
Other Reasons	297	361.60	140.09	247.80	798.36
Orthopedics	26	233.00	26.50	208.45	685.00
Urosurgery	22	597.05	72.50	436.69	1119.33
Gynecology	26	97.60	74.00	91.08	120.00
ENT	37	111.76	65.14	85.00	148.88
Ophthalmology	13	403.00	****	58.89	3500.00
ICU	6	296.33	****	50.75	787.50
Accident	29	349.74	86.75	221.61	1021.40
Fever	24	37.50	0.00	39.29	****
Chest Problem	32	502.22	262.50	54.72	3666.67
Other	79	553.49	268.50	456.38	888.84
TOTAL	533	270.73	96.11	174.95	602.04

Note: **** indicates no observations in this cell. This table is based only on those seeking treatment.

2.3 INDIVIDUAL CHARACTERISTICS

Exhibits 8 and 9 show the percentage of visits to each type of facility by expenditure quintile for outpatients and inpatients, respectively. As expected, the percentage of visits generally rises with expenditure, however, this increase is not spread evenly across the three types of facilities. The proportions of visits to Imbaba and other public facilities stay fairly constant for outpatients and actually fall for inpatients as expenditure quintiles rise. The increase is in the number of visits to private and charitable facilities. Given the extreme differences in average costs of treatment at the various facility types, particularly for inpatient care, the concentration of higher-income patients at private/charitable facilities is particularly striking. It suggests that, when they can afford it, patients are willing to pay much more for a perceived higher quality of care.

EXHIBIT 8: PERCENTAGES OF OUTPATIENT VISITS TO EACH TYPE OF FACILITY BY EXPENDITURE QUINTILE

QUINTILE	IMBABA	OTHER PUBLIC	PRIVATE/CHARITY	TOTAL
Lowest Quintile	1.38	4.53	10.68	16.59
Second Quintile	1.61	4.92	12.75	19.28
Third Quintile	0.61	4.61	13.36	18.59
Fourth Quintile	1.00	4.76	15.75	21.51
Highest Quintile	1.00	4.76	18.28	24.04
TOTAL	5.61	23.58	70.81	100.00

EXHIBIT 9: PERCENTAGE OF INPATIENT VISITS TO EACH TYPE OF FACILITY BY EXPENDITURE QUINTILE

QUINTILE	IMBABA	OTHER PUBLIC	PRIVATE/CHARITY	TOTAL
Lowest Quintile	3.48	10.02	3.48	16.97
Second Quintile	3.48	11.04	3.68	18.20
Third Quintile	3.89	13.50	5.52	22.90
Fourth Quintile	3.07	10.43	5.32	18.81
Highest Quintile	2.45	11.86	8.79	23.11
TOTAL	16.36	56.85	26.79	100.00

Exhibit 10 lists selected variable means for the entire sample and for outpatients by type of facility visited. Characteristics of outpatients at Imbaba more closely parallel those of outpatients visiting private facilities than those visiting other public facilities. The noteworthy exceptions are that patients at Imbaba are less wealthy and less well educated. The average annual expenditure is 5,729 LE for Imbaba patients and 7,951 LE for private patients. The average number of years of education is only four for Imbaba patients and is almost six for private patients.

EXHIBIT 10: SAMPLE MEANS FOR OUTPATIENTS BY TYPE OF FACILITY VISITED

	ENTIRE SAMPLE	IMBABA	OTHER PUBLIC	PRIV/CHAR
Male	0.5069	0.3513	0.4837	0.4281
Age	25.21	27.82	32.15	26.10
5 Years and Under	0.1343	0.1621	0.1201	0.2145
6-15 Years	0.2456	0.2027	0.1883	0.1923
16-35 Years	0.3396	0.2837	0.2110	0.2579
36-55 Years	0.2043	0.2702	0.3409	0.2251
In Hospital in Last Year	0.0712	0.1351	0.1461	0.0993
Ill in Last Month	0.2482	1.0000	1.0000	1.0000
Disabled	0.1068	0.2297	0.3116	0.2367
Health Insurance	0.1954	0.2027	0.4039	0.1571
Currently Working	0.2546	0.1081	0.3019	0.1819
Low Level Clerk	0.0513	0.0270	0.0974	0.0306
Skilled Worker	0.0686	0.0405	0.0714	0.0401
Unskilled Worker	0.0546	0.0135	0.0649	0.0465
Professional	0.0517	0.0135	0.0519	0.0380
Currently in School	0.2950	0.2602	0.1948	0.2321
Years of Education Completed	6.614	4.048	5.704	5.918
Primary Education	0.5065	0.6216	0.5844	0.4978
Secondary Education	0.2307	0.2027	0.1980	0.1881
College Education	0.1054	0.0135	0.0909	0.0792
Annual Expenditure	7783.	5729.	6575.	7951.
Household Size	5.744	5.405	5.175	5.112

In contrast, inpatients at Imbaba differ in many respects from both those visiting other public facilities and those visiting private and charitable facilities. Imbaba has a much higher percentage of female inpatients than the other facility groups and the patients tend to be slightly younger. Among Imbaba's patients, 53 percent are in the 16-35 year-old range, compared to 37 percent and 40 percent at other public and private hospitals, respectively. In contrast, only 15 percent of Imbaba's patients are in the 36 to 55 year age group, versus about 29 percent for both other types of facilities. The percentage of patients from households with health insurance for at least one

member is only about 9 percent at Imbaba, while it is over 30 percent at both the other facility types.

EXHIBIT 11: SAMPLE MEANS FOR INPATIENTS BY TYPE OF FACILITY VISITED

	ENTIRE SAMPLE	IMBABA	OTHER PUBLIC	PRIV/CHAR
Male	0.5069	0.2795	0.4730	0.4238
Age	25.21	27.54	32.48	30.95
5 Years and Under	0.1343	0.0430	0.0603	0.0993
6-15 Years	0.2456	0.1827	0.1523	0.1258
16-35 Years	0.3396	0.5376	0.3746	0.3973
36-55 Years	0.2043	0.1505	0.2920	0.2847
In Hospital in Last Year	0.0712	1.0000	1.0000	1.0000
Ill in Last Month	0.2482	0.2717	0.3343	0.3774
Disabled	0.1068	0.1397	0.2190	0.1589
Health Insurance	0.1954	0.0888	0.3130	0.3533
Currently Working	0.2546	0.0869	0.3418	0.3466
Low Level Clerk	0.0513	0.0000	0.0857	0.1059
Skilled Worker	0.0686	0.0322	0.1047	0.0794
Unskilled Worker	0.0546	0.0322	0.0761	0.0596
Professional	0.0517	0.0107	0.0539	0.0728
Currently in School	0.2950	0.2272	0.1596	0.1632
Years of Education Completed	6.614	4.279	5.990	7.820
Primary Education	0.5065	0.7096	0.5809	0.4437
Secondary Education	0.2307	0.2043	0.2222	0.1986
College Education	0.1054	0.0107	0.1238	0.2317
Annual Expenditure	7783.	6463.	6640.	8798.
Household Size	5.7440	5.576	5.226	5.060

Similarly, the proportion of patients who report being currently employed is also only about 9 percent at Imbaba, but approximately 34 percent at other public and private facilities. As with outpatients, inpatients at Imbaba are generally less well educated, with only one percent having a college-level education, and the average annual expenditure is lower than for patients at other facilities.

These figures depict the average Imbaba inpatient as a younger female with fewer resources to spend on medical services and, consequently, fewer options for care.

The descriptive analysis reveals several interesting points about the demand for care at Imbaba. First, Imbaba is, on average, one of the less expensive options for medical care, with substantial differences even between it and other public facilities. Second, although much of the population appears to be quite affluent, the patients visiting Imbaba are generally from the lower end of the financial spectrum, and are less educated than those visiting other facilities. Imbaba's inpatients, in particular, seem to belong to the more vulnerable social groups. Third, the information on facility use by income group suggests that patients are willing to pay more for a perceived higher quality of care. The relatively low use of Imbaba by those with higher incomes suggests, therefore, that Imbaba is not considered to be of very good quality.

3.0 MULTIVARIATE MODEL

The preceding analysis examined descriptive statistics, means and frequencies, demonstrating how certain key variables related to the demand for medical care. In order to understand the impact of many of these variables jointly on the demand for health services, we estimate a multivariate model of the demand for health care at Imbaba.

The demand for health care is assumed to be influenced by a number of individual characteristics, such as age, gender, and education; household characteristics, such as annual expenditure, health insurance coverage, and family relations; and facility characteristics, such as price, quality, and location. A logit modeling procedure is used to evaluate the importance of each variable in determining this demand. The demand for both outpatient and inpatient care is described as a series of decisions with different variables affecting the choices at each stage.

The decision tree for outpatient care is shown in Exhibit 12. The first stage is the decision to report an illness. This stage is estimated using all people in the sample. The second node of the tree models the choice to seek formal care, conditional on reporting an illness. These first two stages are modeled separately to identify those who choose not to seek formal care as distinct from those who do not report being ill. The proportion of people in the former group is particularly relevant when considering the potential effects of price changes. Implementing a new fee structure should not affect the number of people becoming ill, but it may discourage those who do from obtaining medical attention. Finally, the choice of facility among those seeking treatment is modeled. The survey allowed for a vast number of facility responses, however, econometric analysis requires that each option be cited by a substantial number of respondents. For this reason, the facilities are grouped as Imbaba, other public facilities, and private/charitable facilities.

EXHIBIT 12

Decision Tree for Outpatient Treatment During the Past 30 Days

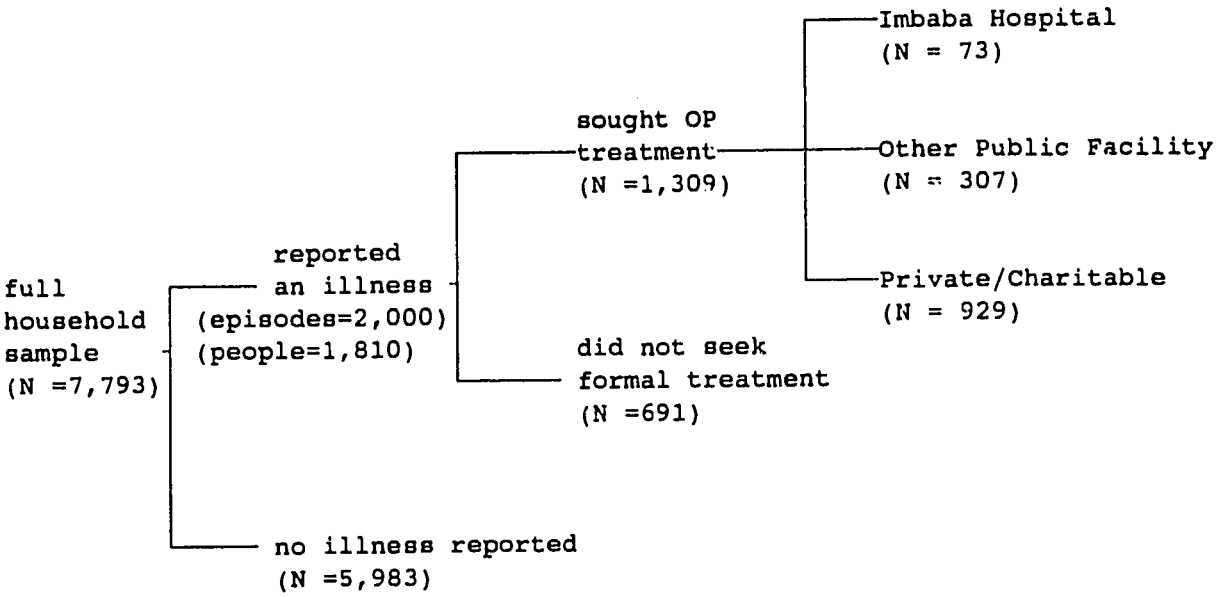


EXHIBIT 13

Decision Tree for Inpatient Treatment During the Past 12 Months

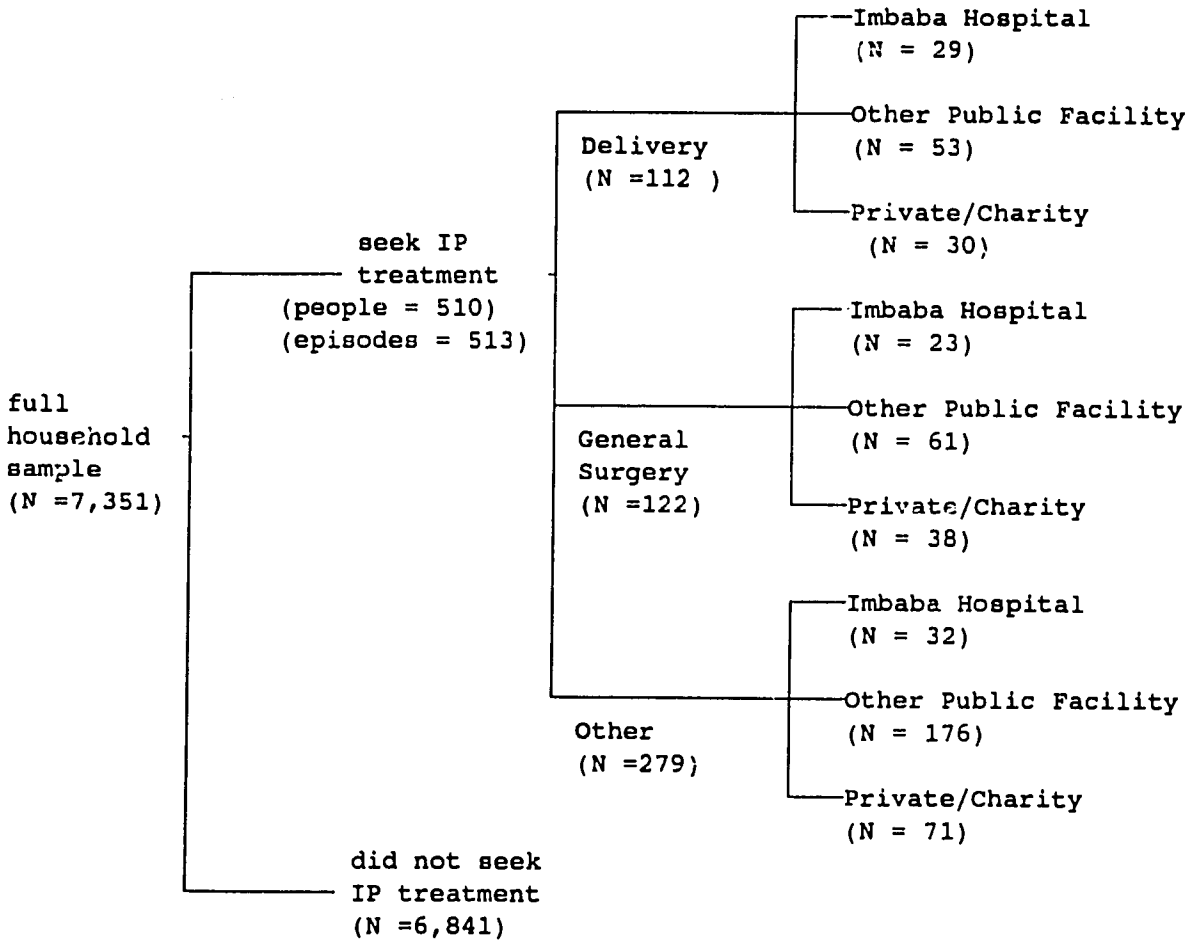


Exhibit 13 depicts the decision tree for inpatient care, which again has three stages. The first node of the tree represents the decision to seek hospital care and is estimated on a per person basis. It essentially combines the first two stages of the outpatient tree; by definition the decision to report an inpatient episode is equivalent to the decision to seek care. The second stage models the type of disease. Although this is not necessarily a "choice" made by patients, it is included as an important determinant of inpatient behavior. The branches of the tree are delivery, general surgery, and other reason. The first two were selected as the most frequently cited reasons for hospitalization. The last stage again models the patient's choice of facility from among the three groups, conditional on the reason for hospitalization.

In botn cases, it is necessary to estimate the first stages separately from the last two, without using an inclusive value.[1] The inclusive value represents a utility index for choices at the next stage. The data collected on outpatient visits in the last 30 days and inpatient visits in the last 12 months allow for each person to record multiple episodes of illness. Information on these additional visits is useful in estimating the last two stages of both models, where decisions are made per episode and each person can make different decisions for different episodes. However, the decision to report an illness and the decision to seek hospital care are estimated on a per person basis, requiring that a different sample be used in these stages. Consequently, the first stage of both models had to be estimated separately from the other two.

3.1 INDEPENDENT VARIABLES

Several variables had to be created for the analysis. Objective measures of quality, such as bed capacity and staff profiles, were not included in the data, and information on travel time was scarce. Annual expenditure was again used instead of income, and the predicted fees for services are based on patient-reported expenditure rather than facility price quotes.

3.1.1 Log of Predicted Expenditure

For many households both the income and annual expenditures variables were missing. These variables have been found to be frequently missing in other studies as well. Therefore instead of using actual expenditures, we used predicted log of annual expenditures. The predicted log of annual expenditures was created using the results from a regression model of the log of actual expenditures. The model is based on characteristics regarding the sex, education level, age, and occupation of the head of the household and on household size. All of the variables except for the age-related ones and current student status are statistically significant, and the r-square is .177. *(See Appendix A for model results.)*

[1] The Inclusive value represents a utility index for choices at the next stage.

3.1.2 Travel Time

The travel time variable used in the last stage of both models was estimated by the average reported travel time to each type of facility by segment of residence. Three approximate travel times, one for each facility type — Imbaba, other public, and private/charitable — were then merged onto each individual's record according to their segment of residence.[2]

3.1.3 Quality Points

A third variable which had to be created was a quality measure of care at the different facility groups. Although detailed information was collected on 10 facilities, it is unfortunately not available for the complete set of facility choices. Therefore a quality estimate was created using the data on preferences from the household survey. Respondents were asked to recommend facilities for patients suffering from several different ailments. They were offered a list of reasons for suggesting each particular facility and could cite as many of the reasons they felt necessary. Points were amassed for each time a quality-related reason (clean, good reputation, prior experience, equipment, thorough exam, specialized, nice staff, drug availability) was cited. The average number of quality points per facility group was then regressed on the facility type and an interaction term between other public and segment of residence and private/charitable and segment of residence. The results of this regression are shown in Appendix B. The resulting quality variable had one value, constant across all segments, for the quality at Imbaba, an average for other public facilities, and an average for private and charitable facilities. The latter two varied across segments to allow for different regions to have different quality options in their vicinity.

3.1.4 Fees

Fees for outpatient and inpatient services were also predicted on the basis of facility type and reason for visit. The outpatient fee used in the regression was the sum of the reported cost of the exam, drugs, tips, diagnostic tests, and other expenses. The inpatient fee included the hospital charge, the doctor's fee, the cost of diagnostic tests conducted both in and out of the hospital, the cost of drugs and supplies, tips, and other charges. For each type of facility group, a predicted fee based on the reason for the visit was merged onto the dataset. For individuals seeking formal treatment but not listing a reason for visiting, the average of predicted fees for each reason by facility type was substituted.

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[2] Imbaba travel times were missing for two of the 10 segments, and the travel times from segments approximately the same distance to Imbaba were substituted.

3.2 RESULTS FROM THE OUTPATIENT MODEL

As discussed earlier, the outpatient decision tree has three stages: the decision to report an illness, the decision to seek formal care, and the choice of which facility to visit. Parameter results for estimation of the full model are presented in Exhibit 14.

It should be noted that the model presented in Exhibit 14 and used in the simulations was not our preferred specification, and the results are highly sensitive to model specification. Our preferred specification included an interaction between outpatient fees and the level of household income, whereas the model presented here includes only a single fee variable, not interacted with predicted income. Results of the original model are presented in Appendix C for comparison. This specification has been used successfully in similar studies, but for this analysis the coefficients in the original model, for price, quality, and the inclusive value, are of the opposite sign than expected. There is a problem in that quality is not adequately controlled for, and increases in price are assumed to indicate better quality facilities. This causes the probability of choosing a particular facility to rise as price increases. The model displayed in Exhibit 14 has the advantage of a negative price coefficient and a positive coefficient on the inclusive value, however the degree of price response is rather extreme.

The first node was estimated per person based on a number of individual and household level variables. Most of the demographic variables, both individual and household level, proved to be significant at this stage. The log of predicted expenditure was found, as expected, to have a significant negative effect on the likelihood of reporting an illness. Higher-income people are probably healthier and thus less likely to become ill. Variables regarding age are also significant, with the very young, age five and under, being most likely to report an illness and those in the older age groups the next most likely. Men are found to be less likely to report an illness than women. Those with health insurance are more likely to report illness than those without health insurance. This is contrary to expected signs, and contrary to the Ellis and Mwabu (1991) report. This unexpected finding may be because people with insurance are more used to seeking care and hence more likely to report an illness, or because people with insurance also have unobserved differences that make them more likely to report an illness.[3]

Relationship to the head of household is also significant, with the household heads being most likely to report an illness, followed by spouses and children. Smaller families are more likely to report illness. Segment of residence was also significant, indicating differences in unmeasured variables. The two variables concerning student and working status are also found to be significant, with students being more likely than non-students to report an illness, and working people being less likely than non-workers to report an illness. However, the variables concerning level of education and specific occupation are not significant.

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[3] The decision to report an illness node was also estimated while including variables on the heads of households, which were mostly insignificant. Since their inclusion added little to the results, the household head variables were dropped.

The second stage of the outpatient model, the decision to seek formal care, was estimated using the same variables as in the first stage, but with the addition of an inclusive value from the third stage and dummy variables for the reason for seeking treatment. The inclusive value is significant and has a positive effect on the decision to seek formal care, implying that the more utility one expects to receive from care, the more likely one is to obtain it.

Many of the individual level variables are also significant at this second stage. Men are less likely than women, and people age 6-35 are less likely than others to seek formal treatment. Spouses are the least likely family members to receive care. People currently working, who in the first stage were less likely to report an illness, are, once they report it, more likely to seek formal care. The opposite is true for current students, who are more likely to report an illness but less likely to seek formal care once ill. Variables regarding the type of occupation, except for unskilled worker, are all significant, as are the dummies for type of disease. Only three of the geographic dummies — called segments — are statistically significant: East Munira, Mataar Imbaba, and Meet Uqba. Consistent with other studies of this type (e.g., Ellis and Mwabu, 1991) the demographic variables are found to be more important in the decision to report an illness and less in the decision to seek care.

The third stage, the choice of facility, was based on the log of predicted expenditure, the predicted fee, travel time, quality, dummy variables for the type of disease, the presence of health insurance, and, for the choice of Imbaba only, the college education variable. All except travel time and quality (both of which have the wrong sign) and the OB/GYN variables are significant. The internal medicine and ear nose throat (ENT) dummies, however, are only significant for the facility choices of Imbaba and other public, respectively. The negative parameters on the log of predicted expenditure and the college education variable support the earlier hypothesis regarding patient characteristics. Higher-income people are much less likely to visit public facilities, particularly Imbaba, and college educated patients are also much less likely to select Imbaba for care. As expected, increases in the predicted fee at a particular facility group have a negative impact on the likelihood of a patient obtaining care from that group. The parameters on health insurance indicate that people with health insurance are less likely to visit either Imbaba or private and charitable facilities, and more likely to visit other public providers. This suggests that the health insurance indicated by survey respondents covered only care at certain public facilities, and not the high cost of care at private and charitable facilities. It is expected that patients with health insurance visit the best facility covered by their plan, and that, if private facilities were included in that coverage, most patients would select them.

EXHIBIT 14: PARAMETER RESULTS FROM THE FULL MODEL OF OUTPATIENT CARE

Results of the Model of Choice to Report an Illness

n = 7793 (people)

Illness Reported n = 1810

No Illness Reported n = 5983

VARIABLE	PARAMETER	STANDARD ERROR	T-STATISTIC
constant	1.4507	1.3977	1.0379
lnpredex	-.4174	.1442	-2.8942
agegp1	.2276	.2571	.8851
agegp2	-.4470	.1605	-2.7851
agegp3	-.5165	.1282	-4.0273
agegp4	-.1327	.1167	-1.1366
currents	.2257	.1115	2.0231
male	-.1939	.0683	-2.8368
healthin	.3263	.0798	4.0853
head	.6388	.1551	4.1166
spouse	.5547	.1442	3.8447
child	.1990	.1251	1.5902
smallfam	.9302	.1390	6.6883
medfam	.3710	.1016	3.6503
muwazzaf	-.1515	.2310	-.6558
skilled	-.1923	.2232	-.8614
unskill	.0811	.2279	.3558
profess	.0704	.2336	.3016
working	-.4659	.2051	-2.2712
primary	.1788	.2226	.8033
second	.0676	.2230	.3034
college	-.1566	.2235	-.7010
emunira	.5632	.1599	3.5214
geziret	.4311	.1757	2.4529
meetuqba	.8161	.1702	4.7945
mataar	.3839	.1703	2.2536
abdelnia	.3523	.1722	2.0448
tajeldu	.6546	.1692	3.8671
elarab	.5398	.1599	3.3753
elhadar	.7190	.1680	4.2793
wmunira	.4162	.1587	2.6211

EXHIBIT 14 (continued)

Results of the Model of the Choice to Seek Formal Care

Total n = 2000 (episodes)

Seek Formal Treatment n = 1309

Do Not Seek Formal Treatment n = 691

VARIABLE	PARAMETER	STANDARD ERROR	T-STATISTIC
constant	1.3089	2.5568	.5119
lnpredx	.1699	.2718	.6252
oplndenk	.0444	.0281	1.5767
male	-.2036	.1249	-1.6293
agegp2	-.5896	.2948	-2.0000
agegp3	-.4315	.2181	-1.9785
agegp4	.0107	.1953	.0550
currents	-.1424	.2063	-.6903
healthin	.1706	.1452	1.1751
head	-.2673	.2892	-.9242
spouse	-.2970	.2756	-1.0775
child	-.2239	.2533	-.8840
smallfam	-.3844	.2659	-1.4454
medfam	-.2277	.2053	-1.1091
muwazzaf	-.6515	.4614	-1.4120
skilled	-.6413	.4421	-1.4503
unskill	-.4361	.4515	-.9659
profess	-.7807	.4548	-1.7165
working	.6479	.4071	1.5912
primary	-.2331	.2790	-.8357
second	-.1864	.2999	-.6216
college	-.0794	.3366	-.2360
emunira	.3438	.3069	1.1200
geziret	.0509	.3353	.1520
meetuqba	-.5766	.3185	-1.8104
mataar	.8882	.3358	2.6451
abdelnia	.1557	.3309	.4705
tajeldu	.2969	.3191	.9304
elarab	-.0452	.3056	-.1478
elhadar	.3193	.3220	.9914
wmunira	-.1834	.3022	-.6068
intmedi	-1.5064	.1453	-10.3628
ent	-.4149	.2949	-1.4067
obgyn	.8860	.5088	1.7413
pediat	-1.1488	.2579	-4.4530

EXHIBIT 14 (continued)

Results of the Outpatient Model of the Choice of Facility
Total n = 1309

Imbaba n = 73

Other Public n = 307

Private/Charitable n = 929

VARIABLE	PARAMETER	STANDARD ERROR	T-STATISTIC
lnpred1	-.9388	.3650	-2.5714
lnpred2	-.5519	.2064	-2.6738
popfee	-.4640	.2426	-1.9125
travti	.0050	.0114	.4433
qpoints	-.0662	.3240	-.2043
im1	-.8903	.3120	-2.8528
im2	-.1267	.1638	-.7739
ped1	-1.1141	.3649	-3.0527
ped2	-.5483	.2026	-2.7053
ent1	-.3919	.3966	-.9879
ent2	-.9097	.2930	-3.1042
obg1	-.5719	.6337	-.9025
obg2	-.0823	.3497	-.2353
health1	-.8659	.3228	-2.6818
health3	-1.2389	.1535	-8.0667
college	-1.8756	1.0270	-1.8263

3.3 RESULTS FROM THE INPATIENT MODEL

The inpatient results are perhaps some of the most interesting; very little modeling of inpatient care in developing countries has been done. The decision tree again has three stages, but they differ from the outpatient model. For inpatients, the decision to report an illness is synonymous with the decision to seek formal care and is modeled as the first stage. The second decision node is a predictor of the reason for seeking care. Three reasons for hospitalization are modeled separately: delivery, general surgery, and other. This second node was modeled separately for inpatient care but ignored for outpatient care for several reasons. First, as illustrated in Exhibits 6 and 7, inpatient fees vary substantially according to the reason for being admitted, while fees for outpatient care are much more similar across different illnesses. Second, the types of services provided to outpatients during a single visit (e.g. diagnostic, prescriptive, curative) and the resources used both tend to be more homogeneous for outpatients than for inpatients. Third, and most importantly, in light of proposals for Imbaba, we were interested in being able to simulate different fee levels for different types of inpatient services, whereas for outpatient services

it is expected that relatively uniform fees will be charged. Ideally, we would have liked to model the demand response for each disease separately. The small number of cases in each individual illness group precluded this. Therefore we modeled only three classes of inpatient care: delivery and general surgery are the two most frequent reasons cited and account for 22.5 percent and 23.3 percent of the total inpatient visits, respectively. The remaining category includes all other reasons for going to the hospital.

Results from estimation of the three-stage inpatient model are presented in Exhibit 15. The first node in the inpatient decision process is based on the same set of variables as the first node of the outpatient process. The log of predicted expenditure is not significant in this case, however, possibly because the decision to seek inpatient care is based more on severity of illness and necessity. Age groupings are all significant except for those aged 36-55 years, who are most similar to the omitted group of people over 55 years. Children aged 6-15 are most likely to be hospitalized. Health insurance is statistically significant and negative, which is contrary to the expected sign. This could indicate that higher- income people are in better health and thus less likely to need hospitalization. Relation to the head of the household is significantly positive for both the heads of households and spouses. The only occupation category that proved to be significant was that of unskilled worker. Except for Mataar Imbaba, all the geographic dummies for individual segments were significant, again indicating differences in unmeasured variables across segments.

The second stage models the type of illness and includes variables regarding income, sex, family size, education, age, and health insurance, and an inclusive value from the choice of facility. Income is significant, and higher-income individuals are less likely to be hospitalized for both delivery and general surgery than for other reasons. The inclusive value is significant and again has a positive influence on all disease options. Gender is, as expected, an important factor for delivery, but is not significant for general surgery. Health insurance is significant for both reasons, and the parameters are negative for delivery cases and positive for cases requiring general surgery. Individuals from medium-sized families are more likely to be hospitalized for both general surgery and delivery than for other reasons. Primary and secondary education are significant and positive for the general surgery option, and having a college education is significant and positive for both. Children under the age of 12 are less likely to be hospitalized for delivery, as expected, and slightly more likely to be hospitalized for general surgery.

The third stage for inpatients was the choice of facility. The decision was modeled based on the log of predicted expenditure, a predicted inpatient fee, travel time, quality, dummies for the reason for hospitalization, health insurance (for the Imbaba and private options), age and education variables for the Imbaba option, and facility choice dummies. All are significant except travel time and primary education level at Imbaba. The parameters on the log of predicted expenditure are, as in the outpatient model, negative and indicate that higher-income patients much prefer the care of private and charitable facilities. The predicted fee has, consistent with demand theory, a negative impact on the choice of facility. Supporting the earlier analysis, parameters on age and education variables suggest that people visiting Imbaba are likely to be slightly

younger than average and have lower levels of education. Furthermore, the parameters on health insurance indicate that people from families with health insurance have a strong tendency to visit private and charitable hospitals and are much less likely to seek care at Imbaba. Unfortunately, the parameter on quality is negative, implying that people gain more utility from visiting lower-quality facilities. This coefficient is only marginally significant and is likely a result of the inadequate quality measures available for the analysis.

EXHIBIT 15: PARAMETER RESULTS FROM THE FULL MODEL OF INPATIENT CARE

Results of the Model of the Choice to Seek Hospital Care

n = 7351 (people)

Hospitalization n = 510

No Hospitalization n = 6841

VARIABLE	PARAMETER	STANDARD ERROR	T-STATISTIC
constant	-3.1464	2.3979	-1.3121
lnpredex	-.1270	.2471	-.5139
agegp1	.4791	.4751	1.0082
agegp2	.8592	.2844	3.0208
agegp3	.6647	.2036	3.2640
agegp4	-.0519	.1972	-.2633
currents	-.4186	.2063	-2.0287
male	-.0444	.1397	-.3179
healthin	.5931	.1312	4.5174
head	.7696	.2706	2.8440
spouse	1.4031	.2493	5.6280
child	-.1899	.2293	-.8280
smallfam	.1421	.2324	.6114
medfam	-.0420	.1723	-.2442
muwazzaf	-.0311	.3551	-.0878
skilled	.2835	.3394	.8354
unskill	.3965	.3518	1.1269
profess	-.2910	.3689	-.7887
working	-.2241	.3272	-.6851
primary	.2080	.3966	.5244
second	.0313	.3986	.0786
colled	.2698	.3941	.6846
emunira	.7035	.2928	2.4027
geziret	.6541	.3186	2.0530
meetuqba	.6453	.3150	2.0483
mataar	.2894	.3225	.8974
abdelnia	.4367	.3169	1.3782
tajeldu	.6657	.3104	2.1447
elarab	.7482	.2921	2.5613
elhadar	.7057	.3062	2.3041
wmunira	.4979	.2931	1.6987

EXHIBIT 15 (continued)

Results of the Inpatient Model of the Type of Disease

Total n = 513 (episodes)

Delivery n = 112

General Surgery n = 122

Other Reason n = 279

VARIABLE	PARAMETER	STANDARD ERROR	T-STATISTIC
lnpred1	-.4636	.1427	-3.2479
lnpred2	-.3472	.0796	-4.3574
iplndens	5.5997	2.2312	2.5096
wkingn1	.1009	.4630	.2180
wkingn2	-.2280	.3029	-.7527
female1	3.6152	.5858	6.1712
female2	.0788	.2572	.3066
hlthin1	-1.1279	.4673	-2.4135
hlthin2	.3849	.2644	1.4559
smlfam1	-.1346	.4889	-.2752
smlfam2	.3561	.4381	.8129
medfam1	.4456	.4281	1.0409
medfam2	.6406	.3881	1.6505
primary1	-.4122	1.0989	-.3751
primary2	1.1253	.5060	2.2238
second1	.4704	1.1334	.4150
second2	1.5639	.5805	2.6937
college1	1.2542	1.1916	1.0525
college2	1.3974	.6329	2.2079
youth1	-3.4982	1.2670	-2.7608
youth2	.2705	.3533	.7655

EXHIBIT 15 (continued)

Results of the Inpatient Choice of Facility

Total n = 513

Imbaba n = 84
Other Public n = 290
Private/Charitable n = 139

VARIABLE	PARAMETER	STANDARD ERROR	T-STATISTIC
lnpred1	-.8225	.5578	-1.4746
lnpred2	-.7272	.3997	-1.8192
pipfee	-.0002873	.0001582	-1.8160
travti	.004590	.01040	.4412
qpoints	-.9171	.4788	-1.9155
matern1	.9214	.3687	2.4987
matern2	-.3087	.2765	-1.1164
gensurg1	.5376	.3646	1.4742
gensurg2	-.3573	.2595	-1.3768
hlthin1	-.9979	.4191	-2.3809
hlthin2	.2326	.2256	1.0309
primed	1.0271	.5469	1.8778
seced	.5370	.6017	.8925
colled1	1.7663	1.1681	-1.5121
ageimb	-.0172	.0084	-2.0506
dum1	5.5916	4.8626	1.1499
dum2	6.7811	3.5132	1.9301

4.0 SIMULATIONS OF DEMAND

The multivariate analysis described above indicates which variables are important determinants of patient behavior, and the results of the models can be used to predict the demand response to changes in certain variables. This section focuses on estimating the impact of a variety of fee changes and health insurance scenarios on the demand for care at Imbaba. Selected fee structures are substituted for the actual fees used in the models, and the probabilities for choosing each option of the decision tree are predicted. For these simulations, we focus on the probabilities of seeking treatment conditional on being sick. Therefore only the last two stages of the estimated outpatient and inpatient models are used. In addition to fee simulations, the probabilities are calculated for four variables of interest: insurance, education, age groups, and expenditure quintiles.

4.1 OUTPATIENT CARE

4.1.1 Fee Simulations

Outpatient demand was simulated for four different fee levels, assuming a single set fee for each visit. Outpatient fees of 1, 5, 10, and 15 were used for the simulations. This range of fees appears plausible and includes the range currently contemplated by the Ministry of Health; by comparison the actual average fee at "other public" facilities is 19.36 LE. The results of the fee simulations are presented in Exhibit 18, and the predicted demand schedules are depicted in Exhibit 16. The first simulation, which is intended to approximate the current situation by setting the Imbaba outpatient fee equal to one, yields probabilities of nine percent, 19 percent, and 51 percent, respectively, of visiting each facility type for outpatient care. These are quite close to the actual proportion of visits. As the fee is increased, there is very little effect on the likelihood of seeking formal care, even when the probabilities are disaggregated by annual expenditure quintile. The distribution across quintiles is shown in Exhibit 17. There are, however, substantial changes in the probability of visiting a particular facility type. For the entire sample, the proportion visiting Imbaba falls to almost zero, dropping from nine percent to two percent, just by increasing the fee to 5. The proportion seeking care both at other public facilities and at private facilities rises. The same story holds for each expenditure quintile when examined separately, but the increase to private is greater as expenditure rises. These simulated responses are very vulnerable to the sensitivity of parameter results to the model specification. For example, this response is considerably greater than that found in Ellis and Mwabu (1991).

EXHIBIT 16

Simulated Effect of Imbaba Outpatient Fees

All Income Groups Combined

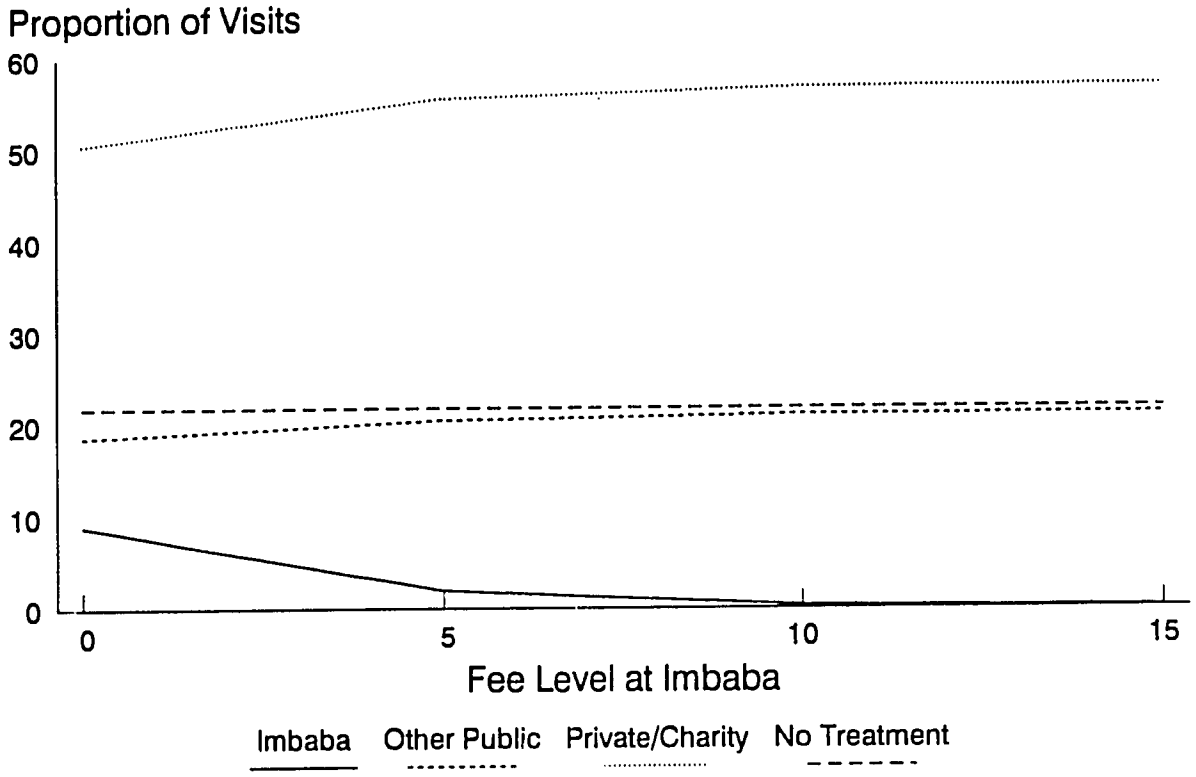
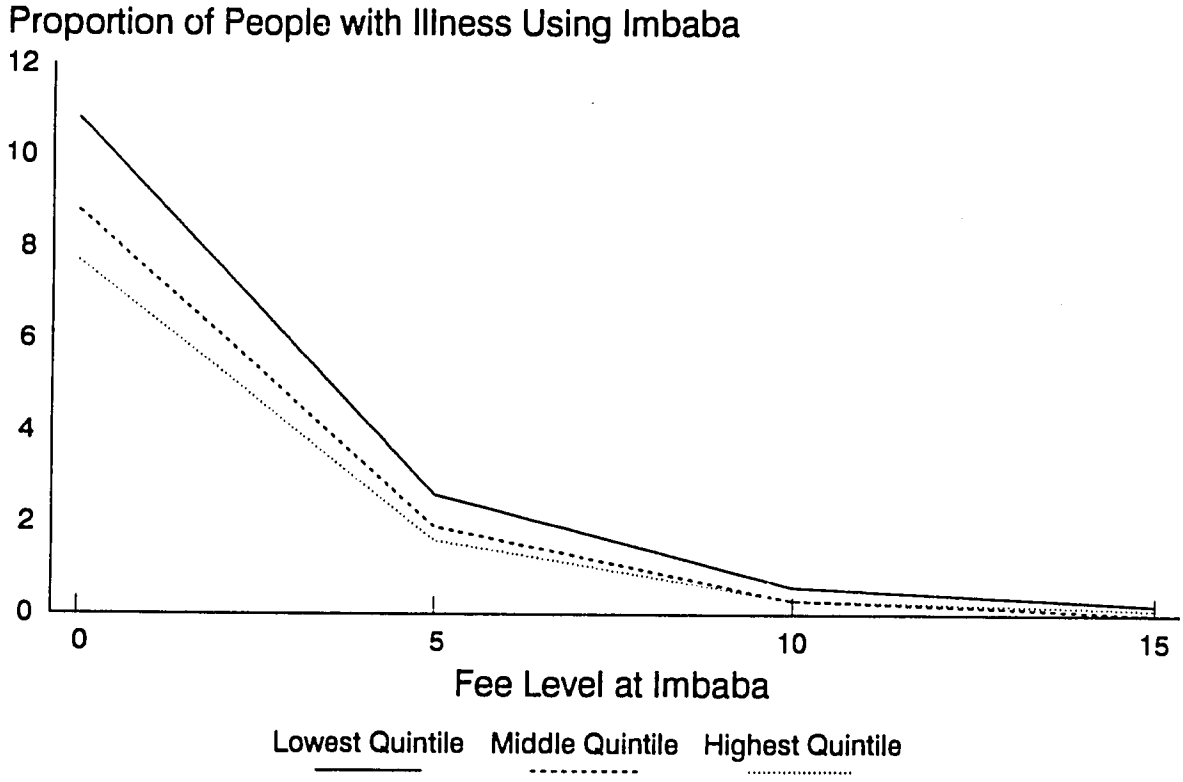


EXHIBIT 17

Simulated Effect of Imbaba Outpatient Fees

By Income Quintile



4.1.2 Simulations of Other Variables

Health insurance, by changing the price of care to the patient, is another variable that can have a significant influence over the demand for care. Outpatient behavior was predicted for both the case of no insurance for anyone, and for that of insurance for all, and the resulting probabilities are presented in Exhibit 19. Changes in health insurance have little effect either on the probability of seeking formal care or on the probability of choosing Imbaba, which declines only slightly. There is, however, a sharp increase in the probability of visiting other public facilities. Interestingly, this increase seems to come from a movement away from private and charitable facility care. The probability of visiting a private provider falls from about 56 percent to 38 percent, while the proportion expected to visit other public facilities rises from 15 percent to 36 percent. The data are not specific on types of insurance, but this supports the idea that most respondents reported provider-specific health insurance schemes.

Exhibit 19 also presents the results from outpatient simulations on age, education, and expenditure. Changes in age are shown to have a substantial effect on the probability of seeking care, which is .83 for children under six, then drops to .73, and climbs back to .83 as age increases. The distribution among facilities, however, is fairly constant over these changes. Education level does have an impact on the likelihood of visiting particular facilities. As education increases, there is a slight increase in the tendency to visit other public facilities and a substantial rise, from 51 percent to 57 percent, in the percentage expected to visit private providers. The probability of choosing Imbaba falls as income rises. The annual expenditure quintile simulations are created by constraining each person's lnpredex to be the mean for each quintile. Changing the distribution of "income" has little effect on the overall probability of seeking treatment, but has an important effect on the probabilities of visiting specific facilities. The probability of visiting Imbaba consistently falls as income rises, from 6.5 percent to 5.1 percent. Again, this indicates that Imbaba is considered a less desirable option for care. The probabilities of visiting other public facilities also decline, going from 20 percent to 18.6 percent. The proportions of visits to private facilities rise with income.

EXHIBIT 18: SIMULATION RESULTS FOR OUTPATIENT FEE INCREASES BY ANNUAL EXPENDITURE QUINTILE

FEE LEVEL	ANNEXQUI	TYPE	FREQ	IMBABA	OTH PUB	PRIVATE	SEEKING	NO SEEK
1	full sample	0	7983	0.090	0.186	0.506	0.782	0.218
5	full sample	0	7983	0.020	0.205	0.556	0.782	0.218
10	full sample	0	7983	0.003	0.210	0.568	0.781	0.219
15	full sample	0	7983	0.001	0.211	0.569	0.781	0.219
1	lowest quintile	1	1144	0.108	0.186	0.475	0.770	0.230
5	lowest quintile	1	1144	0.026	0.211	0.533	0.769	0.231
10	lowest quintile	1	1144	0.006	0.217	0.546	0.769	0.231
15	lowest quintile	1	1144	0.002	0.218	0.549	0.769	0.231
1	second quintile	1	1510	0.091	0.191	0.493	0.774	0.226
5	second quintile	1	1510	0.019	0.211	0.543	0.773	0.227
10	second quintile	1	1510	0.003	0.216	0.555	0.773	0.227
15	second quintile	1	1510	0.001	0.216	0.556	0.773	0.227
1	third quintile	1	1629	0.088	0.185	0.512	0.785	0.215
5	third quintile	1	1629	0.019	0.203	0.561	0.784	0.216
10	third quintile	1	1629	0.003	0.208	0.573	0.784	0.216
15	third quintile	1	1629	0.000	0.209	0.575	0.784	0.216
1	fourth quintile	1	1708	0.096	0.186	0.512	0.794	0.206
5	fourth quintile	1	1708	0.022	0.206	0.565	0.793	0.207
10	fourth quintile	1	1708	0.004	0.211	0.577	0.793	0.207
15	fourth quintile	1	1708	0.002	0.212	0.579	0.793	0.207
1	highest quintile	1	1919	0.077	0.182	0.525	0.784	0.216
5	highest quintile	1	1919	0.016	0.198	0.569	0.783	0.217
10	highest quintile	1	1919	0.016	0.198	0.569	0.783	0.217
15	highest quintile	1	1919	0.001	0.202	0.580	0.783	0.217
1	missing	1	73	0.078	0.203	0.497	0.779	0.221
5	missing	1	73	0.015	0.222	0.542	0.778	0.222
10	missing	1	73	0.002	0.226	0.551	0.778	0.222
15	missing	1	73	0.000	0.226	0.552	0.778	0.222

EXHIBIT 19: SIMULATION RESULTS OF OUTPATIENT VISIT PROPORTIONS BY SELECTED DEMOGRAPHIC VARIABLES

VARIABLES	IMBABA	OTHER PUBLIC	PRIVATE/CHARITY	ALL GROUPS	NO TREATMENT
Insurance					
No insurance	0.059	0.155	0.563	0.777	0.223
Universal insurance	0.057	0.359	0.381	0.797	0.203
Age Group					
All in age group 1	0.062	0.206	0.557	0.825	0.175
All in age group 2	0.056	0.183	0.495	0.734	0.266
All in age group 3	0.058	0.190	0.514	0.761	0.239
All in age group 4	0.062	0.206	0.558	0.827	0.173
Education Level					
All in primary	0.064	0.191	0.517	0.773	0.227
All in secondary	0.065	0.193	0.522	0.780	0.220
All in college	0.011	0.212	0.573	0.796	0.204
All other	0.067	0.200	0.541	0.808	0.192
Annual Expenditures					
All in lowest quintile	0.065	0.205	0.508	0.778	0.222
All in second quintile	0.062	0.201	0.517	0.780	0.220
All in third quintile	0.059	0.197	0.526	0.782	0.218
All in fourth quintile	0.058	0.196	0.528	0.782	0.218
All in highest quintile	0.051	0.186	0.549	0.786	0.214

Thus, demand for outpatient care at Imbaba is highly sensitive to even small changes in fees. Additionally, health insurance status seems to have little effect on outpatient care seeking behavior.

4.2 INPATIENT SIMULATIONS

4.2.1 Fee Simulations

Simulating inpatient fee changes was more complicated than the above simulation, because fees differ according to illness and required treatment. Again the first simulation used the actual averages for treatment at Imbaba: 40, 100, and 140 for delivery, general surgery and other visits, respectively. The resulting probabilities of seeking care at each facility type were 12 percent, 61 percent, and 26 percent, which are very close to the observed ratios. Flat rate fee increases of 20 percent, 50 percent, and 100 percent were simulated next. Results are presented in Exhibit 20 and Exhibit 21. Although these changes cause the probability of hospitalization at Imbaba to fall as expected, the differences are very small. Next, we performed simulations that changed fees at Imbaba to resemble those at other public hospitals and then those at private facilities. Again, the likelihood of choosing Imbaba for inpatient care falls as the price increases, but the changes are small, even for the drastic increases necessary to approximate fees at private facilities.

While these inpatient simulations tell a plausible story of inpatient care being less sensitive to fee increases than outpatient care, this result is highly sensitive to the particular model specification, notably the exclusion of fees interacted with the predicted expenditure variable. An alternative specification is presented in Appendix C, which indicates a positive relationship between fees and level of use at Imbaba. As with the outpatient model, the likely cause of this sensitivity is that quality is imperfectly measured.

4.2.2 Simulations of Other Variables

In contrast to outpatient services, inpatient behavior is substantially affected by health insurance changes. As Exhibit 22 shows, the probability of selecting Imbaba for inpatient care falls from about 14 percent to about five percent as insurance coverage is changed from none to coverage for everyone. This pattern holds for all expenditure levels. There is a slight increase in the proportion visiting other public hospitals, but the bulk of the increase is in people visiting private facilities.

Simulations on age, education, and annual expenditure variables are also done for inpatients, and the results are shown in Exhibit 22. Specific classes of age are not modeled in the last two inpatient stages, but rather are lumped as youths and adults, youths defined as children under 12. Simulations on this age-related variable generate the same results as in the outpatient model; there is almost no effect on the distribution of probabilities among facilities. Results of the educational level simulations are more interesting. Consistent with the trend discussed throughout the report, as education rises, individuals are less likely to visit Imbaba. The probability of visiting both other public and private facilities increases by 10.8 percent and 4.9 percent, respectively. Annual expenditure simulations also reveal a recurring pattern — wealthier individuals prefer care at private facilities. As the population is moved from the lowest to the highest expenditure quintile, the probability of visiting

Imbaba falls slightly, a change of about one percent, and there is approximately a two percent decrease in the likelihood of seeking care from other public facilities. The probability of choosing a private facility is shown to rise slightly with income.

EXHIBIT 20: SIMULATED EFFECT OF IMBABA INPATIENT FEES - ALL INCOME GROUPS COMBINED

EXHIBIT 21: SIMULATION RESULTS FROM INPATIENT FEE INCREASES BY ANNUAL EXPENDITURE QUINTILE

FeeLev1	FeeLev2	FeeLev3	Annexqui	(n)	Imbaba	Othpub	Private
40	100	140	full sample	7777	0.123	0.612	0.263
50	125	175	full sample	7777	0.122	0.613	0.263
60	150	210	full sample	7777	0.121	0.614	0.264
80	200	280	full sample	7777	0.120	0.615	0.264
60	100	240	full sample	7777	0.121	0.614	0.264
400	375	800	full sample	1107	0.108	0.623	0.268
40	100	140	lowest quintile	1107	0.129	0.627	0.243
50	125	175	lowest quintile	1107	0.128	0.628	0.243
60	150	210	lowest quintile	1107	0.127	0.628	0.243
80	200	280	lowest quintile	1107	0.125	0.630	0.244
60	100	240	lowest quintile	1107	0.127	0.629	0.243
400	375	800	lowest quintile	1460	0.113	0.638	0.247
40	100	140	second quintile	1460	0.129	0.619	0.250
50	125	175	second quintile	1460	0.128	0.620	0.250
60	150	210	second quintile	1460	0.127	0.621	0.251
80	200	280	second quintile	1460	0.125	0.622	0.251
60	100	240	second quintile	1460	0.127	0.621	0.251
400	375	800	second quintile	1590	0.126	0.614	0.258
40	100	140	third quintile	1590	0.114	0.630	0.255
50	125	175	third quintile	1590	0.125	0.615	0.258
60	150	210	third quintile	1590	0.124	0.616	0.259
80	200	280	third quintile	1590	0.122	0.617	0.259
60	100	240	third quintile	1590	0.124	0.616	0.259
400	375	800	third quintile	1667	0.111	0.625	0.263
40	100	140	fourth quintile	1667	0.126	0.611	0.262
50	125	175	fourth quintile	1667	0.125	0.611	0.262
60	150	210	fourth quintile	1667	0.124	0.612	0.263
80	200	280	fourth quintile	1667	0.122	0.613	0.263
60	100	240	fourth quintile	1667	0.124	0.612	0.263
400	375	800	fourth quintile	1881	0.111	0.621	0.267
40	100	140	highest quintile	1881	0.111	0.598	0.290
50	125	175	highest quintile	1881	0.110	0.598	0.290
60	150	210	highest quintile	1881	0.109	0.599	0.290
80	200	280	highest quintile	1881	0.107	0.600	0.291
60	100	240	highest quintile	1881	0.109	0.599	0.291
400	375	800	highest quintile	72	0.097	0.607	0.294
40	100	140	missing	72	0.114	0.611	0.273
50	125	175	missing	72	0.113	0.612	0.273
60	150	210	missing	72	0.113	0.612	0.274
80	200	280	missing	72	0.111	0.613	0.274
60	100	240	missing	72	0.112	0.612	0.274
400	375	800	missing		0.100	0.621	0.277

EXHIBIT 22: SIMULATION RESULTS OF INPATIENT VISIT PROPORTIONS BY SELECTED DEMOGRAPHIC VARIABLES

VARIABLES	IMBABA	OTHER PUBLIC	PRIVATE/CHARITY
Insurance			
No insurance	0.137	0.612	0.250
Universal insurance	0.053	0.624	0.321
Age Group			
All are youths	0.125	0.612	0.262
None are youths	0.124	0.611	0.263
Education Level			
All in primary	0.169	0.580	0.249
All in secondary	0.112	0.619	0.268
All in college	0.012	0.688	0.298
All other	0.070	0.652	0.277
Annual Expenditures			
All in lowest quintile	0.129	0.631	0.238
All in second quintile	0.127	0.623	0.248
All in third quintile	0.125	0.615	0.259
All in fourth quintile	0.124	0.613	0.261
All in highest quintile	0.119	0.594	0.286

5.0 CONCLUSION AND POLICY IMPLICATIONS

The goal of this paper is to provide insight on the potential for cost recovery at Imbaba Hospital. To accomplish this task, we assessed the current situation at Imbaba, including patient characteristics, fee structure, and facilities, and compared Imbaba with the other general types of facilities. We estimated a model of the demand for care and determined which factors are particularly influential to the choice of facility. Finally, we simulated the effects of changes in the cost of care and other variables such as income, education, and insurance. Problems arising from an inadequate quality measure prohibit the estimation of a direct price response, however, the results have several implications for policy formation.

Imbaba is frequented by patients with a lower annual expenditure than other patients. This is important because any price changes aimed at cost recovery must make allowances for those patients with limited ability to pay. It seems clear from the comparisons between facility groupings that Imbaba is considerably less desirable than the others and is the most likely choice of lower-income patients. Scaling facility offerings, such as amenities for inpatient care, may be one way of accommodating patients at both ends of the expenditure spectrum, and could generate revenue from services and accommodations beyond the basic necessities.

Imbaba is generally on the lower end of the patient cost comparisons between facilities. There is strong evidence that patients with the ability to pay for care prefer hospitals with higher average costs, presumably because they offer better quality care. Private and charitable facilities receive higher scores on a variety of quality dimensions such as reputation, cleanliness, equipment, and drug availability. For Imbaba to draw away demand from private and charitable facilities, it should offer higher quality. Conducting further studies comparing quality aspects of the large hospitals could specifically identify the areas where improvements are necessary. This is essential to generating revenue, because those with the ability to pay must be lured away from the competing hospitals.

Although direct demand response from price changes cannot be estimated because of the quality control problem, there seems to be evidence, consistent with our expectations, that the potential for revenue generation is much greater for inpatient services than for outpatient treatment. Bed charges, which can vary substantially according to amenities requested, contribute a large portion of total inpatient cost.

In addition to improving the situation at Imbaba and drawing patients with higher annual expenditures, the government can undertake policies which increase the overall demand for medical care. Characteristics of income, education, and insurance are shown to strongly impact the use of medical services.

Several policy conclusions follow from our analysis. Since there is a significant willingness to pay for higher-quality services, the Ministry of Health should work to improve the quality of services provided at Imbaba. Perhaps it could specialize, using resources from other areas to improve delivery of the more popular services. Opening the new building may be a good first step.

Results from the household survey do not provide a clear indication of the demand response that can be expected from raising fees at Imbaba, since higher fee levels are currently linked with higher average quality. There is some evidence in the data, supported by other studies, that the demand for inpatient care is much less responsive to fee levels than the demand for outpatient services. Given the higher resources used in inpatient care, it is appropriate that a new fee structure continue to charge substantially more for inpatient than outpatient services.

Fee increases could be used to help finance the quality improvements, but caution needs to be taken to ensure that lower-income patients, who tend to frequent Imbaba, are not excluded from care. Lower-income individuals already consume substantially fewer health services than higher-income individuals. Significant fees may worsen this situation.

Much of the current revenue is generated from bed charges for inpatient visits. Since wealthy people seem willing to pay high rates for a perceived high quality of care, it may be useful to scale accommodations in such a way that the desired amenities can be offered to patients at a higher price, but the option for basic low-cost care is still available.

APPENDIX A: REGRESSION MODEL OF THE LOG OF ANNUAL EXPENDITURE

EXHIBIT A-1:

dependent variable: logannex

sum of squares	mean square	f value	pr > f	r-square	c.v.
91.45365730	3.15357439	8.90	0.0001	0.176879	6.8622

parameter		estimate	t for h0: parameter=0	pr > |t|	std error of estimate
intercept		10.12189463	16.41	0.0001	0.61685335
headsex		-0.08169623	-0.85	0.3945	0.09591708
hagegp3		-0.18076943	-2.91	0.0037	0.06213226
hagegp4		-0.03866837	-0.69	0.4923	0.05629966
hcurrent		0.03596654	0.20	0.8429	0.18148640
healthin		0.00079826	0.02	0.9844	0.04069049
nind	1	-1.72901388	-2.80	0.0051	0.61689228
	2	-1.21975946	-2.03	0.0422	0.59986194
	3	-1.20586151	-2.01	0.0444	0.59913817
	4	-1.08838702	-1.82	0.0688	0.59761082
	5	-0.99450345	-1.66	0.0962	0.59733276
	6	-0.89353725	-1.50	0.1351	0.59763209
	7	-1.01301728	-1.69	0.0907	0.59837812
	8	-0.70125815	-1.17	0.2441	0.60171525
	9	-0.83166868	-1.36	0.1737	0.61102794
	10	-0.58152214	-0.93	0.3509	0.62312508
	11	-0.29309427	-0.44	0.6602	0.66652945
	12	-1.02270136	-1.40	0.1619	0.73080075
	13	-0.11149730	-0.15	0.8786	0.72980289
	14	0.20629946	0.24	0.8068	0.84335634
	15	0.43570499	0.52	0.6049	0.84185549
	21	0.00000000	.	.	.
Agriculture		-0.29808547	-1.10	0.2710	0.27066728
Muwazzaf		0.06545236	1.04	0.2966	0.06268180
Other		0.19289173	2.05	0.0404	0.09402750
Owner of shop		0.48902630	6.37	0.0001	0.07682398
Professional		0.11777375	1.56	0.1184	0.07536172
Skilled worker		0.04091415	0.81	0.4161	0.05029154
Unskilled worker		0.00000000	.	.	.
hprimary		-0.46468677	-4.63	0.0001	0.10027513
hsecond		-0.38851075	-3.96	0.0001	0.09814903
hcollege		-0.15556937	-1.72	0.0850	0.09024883

APPENDIX B: PERCENTAGES CHOOSING EACH FACILITY GROUP BY REASON FOR VISIT

EXHIBIT B-1: *Outpatient Care*

(Percentages used to create Exhibit 4)

REASON FOR VISIT	FACILITY GROUP			
	IMBABA	OTHER PUBLIC	PRIV/CHAR	TOTAL
Surgery	12.86	30.00	57.14	100.00
Internal Medicine	3.93	26.79	69.28	100.00
Pediatric	3.64	15.89	80.46	100.00
Orthopedic	5.88	31.93	62.18	100.00
Urology	14.08	22.54	63.38	100.00
OB/GYN	5.45	23.64	70.91	100.00
Skin and Venereal	5.88	38.24	55.88	100.00
ENT	7.14	13.49	79.37	100.00
Ophthalmology	2.86	31.43	65.71	100.00
Dentistry	7.14	21.43	71.43	100.00
Other	0.00	16.67	83.33	100.00
TOTAL	5.59	23.41	71.00	100.00

EXHIBIT B-2: ***Inpatient Care***

(Percentages used to create Exhibit 5)

REASON FOR VISIT	FACILITY GROUP			
	IMBABA	OTHER PUBLIC	PRIV/CHAR	TOTAL
Orthopedics	7.69	84.62	7.69	100.00
Urosurgery	9.09	63.64	27.27	100.00
Delivery	25.89	47.32	26.79	100.00
Gynecology	15.38	53.85	30.77	100.00
ENT	18.92	29.73	51.35	100.00
Ophthalmology	0.00	69.23	30.77	100.00
ICU	0.00	66.67	33.33	100.00
Accident	13.79	68.97	17.24	100.00
Fever	8.33	91.67	0.00	100.00
Chest problem	21.88	65.63	12.50	100.00
General surgery	18.11	48.82	33.07	100.00
Other	7.59	64.56	27.85	100.00
TOTAL	16.14	56.85	27.02	100.00

APPENDIX C: LOGIT RESULTS FROM PREFERRED SPECIFICATION WITH INTERACTION TERMS BETWEEN FEE LEVELS AND PREDICTED ANNUAL EXPENDITURES

EXHIBIT C-1: *Outpatient Model Results (Alternative Specification)*

Results of Original Model - Seek Formal Care

n = 2000

Did Seek Treatment n= 1309
Did not Seek Treatment n= 691

VARIABLE	PARAMETER	STANDARD ERROR	T-STATISTIC
constant	.48614117	2.5973014	.18717164
lnpredex	.26911800	.28313179	.95050436
oplndenk	-.11896932	.72012899d-01	-1.6520556
male	-.20186483	.12503110	-1.6145170
agegp2	-.59170721	.29483405	-2.0069161
agegp3	-.43456849	.21817887	-1.9917991
agegp4	.14421560d-01	.19538150	.73812310d-01
currents	-.14489962	.20643148	-.70192599
healthin	.31518461d-01	.15651760	.20137327
head	-.27264226	.28938051	-.94215833
spouse	-.29848834	.27568875	-1.0827005
child	-.22020959	.25340883	-.86898938
smallfam	-.38945824	.26597426	-1.4642704
medfam	-.22973986	.20536559	-1.1186872
muwazzaf	-.65266321	.46147345	-1.4143028
skilled	-.64656533	.44213913	-1.4623572
unskill	-.44222069	.45133280	-.97981067
profess	-.78255072	.45495130	-1.7200758
working	.65163151	.40719956	1.6002756
primary	-.23471252	.27895687	-.84139359
second	-.18429969	.30002330	-.61428458
college	-.82088138d-01	.33662130	-.24385901
emunira	.34155461	.30700146	1.1125504
geziret	.45682711d-01	.33536130	.13621939
meetuqba	-.57538647	.31855264	-1.8062524
mataar	.88415910	.33583610	2.6327101
abdelnia	.15376942	.33094819	.46463291
tajeldu	.29759885	.31919098	.93235356
elarab	-.44628827d-01	.30571079	-.14598381
elhadar	.31707204	.32211581	.98434175
wmunira	-.18261583	.30230747	-.60407316
intmedi	1.5230912	.14669180	-10.382934
ent	-.43434656	.29726060	-1.4611642
obgyn	.88985750	.50763479	1.7529482
pediat	1.1645916	.25940998	-4.4893862

EXHIBIT C-1 (continued)

Results of Original Facility Choice Model - Outpatients

n = 1309

Imbaba	n= 73
Other Public	n= 307
Private/Charity	n= 929

VARIABLE	PARAMETER	STANDARD ERROR	T-STATISTIC
1 popfee	-.48655322	.24023220	-2.0253456
2 feeexp	.74366366d-01	.27658674d-01	2.6887177
3 travti	.73379767d-03	.81098226d-02	.90482579d-01
4 qpoints	-.19959169d-01	.31159306	-.64055242d-01
5 im1	-.85228656	.30565987	-2.7883495
6 im2	-.15375113	.15529266	-.99007337
7 ped1	-1.0731102	.35838684	-2.9942790
8 ped2	-.57789731	.19448719	-2.9713901
9 ent1	-.35152052	.39081656	-.89945145
10 ent2	-.93400588	.28905721	-3.2312146
11 obg1	-.53717909	.63143221	-.85073121
12 obg2	-.11564295	.34366045	-.33650353
13 health1	-.81315060	.30791856	-2.6407976
14 health3	-1.2153568	.14691810	-8.2723424
15 colled	-1.8251566	1.0227211	-1.7846084

EXHIBIT C-2: *Inpatient Model Results (Alternative Specification)*

Results of Original Model - Disease Choice

n = 513

Delivery	n=112
General Surgery	n=122
All Other	n=279

VARIABLE	PARAMETER	STANDARD ERROR	T-STATISTIC
1 lnpred1	-.38040250	.14085295	-2.7007067
2 lnpred2	-.27420881	.73316142d-01	-3.7400878
3 ipindens	2.0090692	1.3443429	1.4944619
4 wkingn1	.53321195d-02	.46029389	.11584163d-01
5 wkingn2	-.29450864	.30509692	-.96529537
6 female1	3.4908765	.57749162	6.0448956
7 female2	-.41991606d-02	.25351009	-.16564077d-01
8 hlthin1	-1.0541465	.46615514	-2.2613641
9 hlthin2	.43174480	.26416304	1.6343876
10 smlfam1	-.35819292	.50904466	-.70365717
11 smlfam2	.67921956d-01	.46519912	.14600620
12 medfam1	.32786193	.43483801	.75398636
13 medfam2	.46799632	.39400628	1.1877890
14 primary1	-.71026562	1.1097437	-.64002671
15 primary2	.93025102	.49871288	1.8653038
16 second1	.22586690	1.1442607	.19739111
17 second2	1.4182881	.57699067	2.4580781
18 college1	1.1687417	1.2002525	.97374651
19 college2	1.4000003	.63773249	2.1952783
20 youth1	-3.7162918	1.2940230	-2.8718901
21 youth2	.11946914	.34865275	.34265939

EXHIBIT C-2 (continued)

Results of Original Model - Choice of Facility for Inpatients

n = 513

Imbaba	n= 84
Other Public	n=290
Private/Charity	n=139

VARIABLE	PARAMETER	STANDARD ERROR	T-STATISTIC
1 pipfee	-.96953705d-02	.47298742d-02	-2.0498157
2 feeexp	.10770834d-02	.53719165d-03	2.0050263
3 travti	.50669045d-02	.10301528d-01	.49185949
4 qpoints	-.93303554	.47963381	-1.9453081
5 matern1	.91901204	.36790888	2.4979338
6 matern2	-.32185183	.27593990	-1.1663838
7 gensurg1	.53476939	.36395696	1.4693204
8 gensurg2	-.36778435	.25894703	-1.4203073
9 hlthin1	-.99728912	.41904002	-2.3799377
10 hlthin3	.24728491	.22476551	1.1001907
11 primed	1.0292149	.54511961	1.8880533
12 seced	.54083310	.60004868	.90131536
13 colled	-1.7870629	1.1642213	-1.5349856
14 ageimb	-.17060608d-01	.83818867d-02	-2.0354139
15 dum1	-1.5952698	.61275964	-2.6034185
16 dum2	.43647976	.32886742	1.3272211

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