Discussion Paper No. 9605 September 1996

The Choice of Adult Health Care Provider and Access Across Income Groups: The Philippine Case

by

Panfila Ching and Fidelina Natividad-Carlos*

*Former Assistant Professor, and Associate Professor, School of Economics, University of the Philippines respectively.

THE CHOICE OF ADULT HEALTH CARE PROVIDER AND ACCESS ACROSS INCOME GROUPS: THE PHILIPPINE CASE

Panfila Ching* and Fidelina B. Natividad-Carlos**
School of Economics, University of the Philippines,
Diliman, Q.C., The Philippines, 1101

Abstract

This paper investigates the demand for adult health care in the Philippines using a theoretical model that implies a natural interrelation between price and income. The demand function takes on a conditional/mixed logit (CLGT) form. The CLGT model is estimated using country-wide data from the 1981 National Health Survey, which has information on price that is collected contemporaneously with the rest of the variables. The results show that price and income do affect the demand for adult health care and that poor adults are more sensitive to price changes than rich adults. The implication is that user fees are regressive and hence would affect adversely the access of adults to health care.

Key words: Demand for adult health care; Price elasticity of demand; Access across income groups; User fees

* Former Assistant professor, University of the Philippines.
** Associate Professor, University of the Philippines.

1. Introduction

Governments are under pressure to provide subsidized health care to lower income groups of the population but at the same time subsidies strain the overburdened tax system. User fees for health care may therefore become necessary in order to raise revenues which the government can reinvest in health care. The problem with user fees, however, is that they may be regressive as different income groups may experience differential access to health care because the poor may be more price sensitive than the rich. Thus, the potential effects of user fees depend on the price elasticities of demand for health care for different income groups.

Evidence on the price elasticity of demand for health care are mixed. Results of studies on two of the thirteen regions in the Philippines, Bicol (Akin, Griffin, Guilkey, and Popkin (1985, 1986)) and Cebu (Schwartz, Akin, and Popkin (1988)), show that price and income have negligible effect on the demand for health care. In contrast, results of studies on two developing countries, Peru (Dor, Gertler, and van der Gaag (1987); Gertler and van der Gaag (1990)) and Côte d´ Ivoire (Gertler, Locay, and Sanderson (1987); Gertler and van der Gaag (1990)), indicate that price affects the demand for health care and that the price elasticities fall as income rises.

A more recent study about the Philippines (Ching, 1995) investigates the demand for children´s health care across income groups. It shows that price plays a significant role in the demand for child health care and that for poorer children demand is substantially more price sensitive than for richer children, implying that user fees are regressive.

The focus of this study, on the other hand, is on the demand for adult health care across income groups.[1] In particular, this study analyzes the following issues: (1) is the demand for adult health care price elastic and (2) if so does the elasticity fall as income rises and, hence, are user fees for adult health care regressive?

This study examines the demand for adult health care in the Philippines using the discrete choice model of Gertler et al. This model explicitly allows the price elasticity of demand for health care to vary with the level of income.[1] The demand function takes on the conditional/mixed logit form and a test is done on the validity of the assumption that the odds ratios are independent of the other alternatives.

The demand function for adult health care is estimated using national data on choice of health care facility in the Philippines. However, it is difficult to assess the direction and magnitude of the effect of prices and income on demand directly from the estimation results. Thus point price elasticities of demand are calculated by income quartile; from these estimates, one can infer whether user fees can be a significant source of revenue for the country´s health care system and whether user fees will be regressive.

2. Empirical model

2.1 Utility maximization problem

This study adopts the behavioral model of Gertler et al., an extension of McFadden´s (1981) discrete choice model, which allows for the interrelation

between income and price in the demand for health care function.

In this model, utility is assumed to depend on health and on the consumption of goods other than health care.[2] When an individual experiences an illness, he/she has to decide whether to seek care, and the benefit from consuming health care is the expected improvement in health status while the cost of health care is the reduction in the consumption of other goods. He/she also has to choose what type of health care to obtain, one of which is self-care. Each alternative offers an expected improvement in health for a price, which includes both monetary costs and non-monetary access costs. Given this information, the expected utility of individual i, conditional on receiving health care from provider j, is given by:

$$U_{ij} = U(H_{ij}, C_{ij}, T_{ij}), \tag{1}$$

where H_{ij} is the expected health status of individual i after receiving health care from provider j; C_{ij} is the consumption of individual i, net of the monetary cost of obtaining health care from provider j, and, T_{ij} is the nonmonetary cost of access to provider j of individual i.[3]

The budget constraint faced by individual i is given by:

$$C_{ij} + P_{ij} = Y_i, \tag{2}$$

where P_{ij} is the total price (sum of direct payment to the provider and the indirect cost of access) and of provider j's care faced by individual i and Y_i is individual i's income. Substitution of (2) for C_{ij} into (1) yields the indirect conditional utility function:

$$U_{ij} = U(H_{ij}, Y_i - P_{ij}, T_{ij}), \tag{3.1}$$

where $Y_i - P_{ij}$, derived from budget constraint, is equal to C_{ij}, the consumption expenditure of individual i net of expenditure on health care. Notice that income affects utility through the consumption term and the price of health care is forgone consumption.

It is assumed that the conditional utility function is semiquadratic, i.e., linear in health but quadratic in consumption. Hence, (3.1) can be rewritten as:

$$U_{ij} = \alpha_0 H_{ij} + \alpha_1(Y_i - P_{ij}) + \alpha_2(Y_i - P_{ij})^2 + \alpha_3 T_{ij} + \epsilon_{ij}, \tag{3.2}$$

where ϵ_{ij} is a random shock that is uncorrelated across individuals and alternatives. This functional form allows the marginal rate of subsitution of health for consumption to be decreasing, constant, or increasing and hence the demand for health care to vary by income level. The quadratic term tests, rather than imposes, normality and diminishing marginal rate of subsitution of health for consumption. In particular, if the marginal rate of subsitution of health for consumption diminishes as income rises, holding health constant, then health is a normal good. Moreover, if health is a normal good, then the demand for health care increases with income. In a discrete choice situation, this means that as income rises, individuals are more likely to choose the higher-price and higher-quality alternatives.

The expected quality of provider j's health care, Q_{ij}, is defined as the difference between the expected health status as a result of obtaining care

from provider j, H_{ij}, and the expected health status if the individual treated him or herself, H_{i0}, i.e., $Q_{ij} = H_{ij} - H_{i0}$. Thus, the expected health care production function is of the following form:

$$H_{ij} = Q_{ij} + H_{i0}, \tag{4}$$

where quality may vary by individual (provider) because of varying individual (provider) characteristics.

Quality is incorporated into the model by substituting the health production function (4) into the conditional utility function (3.2):

$$\tilde{U}_{ij} = \alpha_0 H_{i0} + \alpha_0 Q_{ij} + \alpha_1(Y_i - P_{ij}) + \alpha_2(Y_i - P_{ij})^2 + \alpha_3 T_{ij} + \epsilon_{ij}. \tag{5}$$

Utility depends on the health status expected with self-care and on quality, both of which are not observed. The term $\alpha_0 H_{i0}$ can be ignored since it appears in the conditional utility function for all the choices with a value that is constant across alternatives and since only utility differences matter. On the other hand, given (4), the unobservable quality $\alpha_0 Q_{ij}$ can be assumed as a parametric function of its observable determinants:

$$\alpha_0 Q_{ij} = \beta_{0j} + \beta_{1j} X_i + \beta_{2j} Z_{ij} + \tau_{ij}, \tag{6}$$

where X_i is a vector of characteristics of individual i and Z_{ij} is a vector of characteristics of provider j faced by individual i. The intercepts β_{0j} are allowed to differ to permit the base quality to vary by alternative while the random shock term τ_{ij} is assumed to be uncorrelated across individuals but may be correlated across alternatives.

The simplified conditional utility function is obtained by substituting (6) for $\alpha_0 Q_{ij}$ into (5) and ignoring the term $\alpha_0 H_{i0}$. Thus, for options $j = 0, 1, \ldots, J$, the indirect conditional utility function of individual i is

$$U_{ij} = \beta_{0j} + \beta_{1j} X_i + \beta_{2j} Z_{ij} + \alpha_1(Y_i - P_{ij}) + \alpha_2(Y_i - P_{ij})^2 + \alpha_3 T_{ij} + \epsilon_{ij} + \tau_{ij}, \tag{7}$$

where the coefficients on the variables representing individual (provider) characteristics are not (are) constant across alternatives.

Thus, the unconditional utility maximization problem, given that individual i has $J + 1$ feasible alternatives (with $J = 0$ alternative being self-care), is

$$U^*_i = \max(U_{i0}, U_{i1}, \ldots U_{iJ}), \tag{8}$$

where U^*_i is individual i's maximum utility.

The solution to (8) yields a system of demand functions whose forms are the probabilities that the alternatives are chosen. Specifically, it gives the alternative that is chosen and, in the presence of random terms in the model, the probability that each alternative is chosen. The probability that a particular alternative is chosen equals the probability that this alternative yields the highest utility among all the alternatives. In a discrete choice model, the probability that an alternative is chosen can be interpreted as a demand function. The functional form of the demand function depends on the assumed functional form of the conditional utility function.[4]

2.2 Demand function for health care

The demand function for a provider is the probability that the utility enjoyed by the individual from that alternative is higher than the utility from any of the other alternatives. In this study, it is assumed that the demand function takes on a mixed/conditional logit (CLGT) form:

$$\pi_{ij} = \{\exp[\beta_{0j} + \beta_{1j}X_i + \beta_{2j}Z_{ij} + \alpha_1(Y_i - P_{ij}) + \alpha_2(Y_i - P_{ij})^2 + \alpha_3 T_{ij}]\} / \{\Sigma_j[\beta_{0j} + \beta_{1j}X_i + \beta_{2j}Z_{ij} + \alpha_1(Y_i - P_{ij}) + \alpha_2(Y_i - P_{ij})^2 + \alpha_3 T_{ij}]\} \quad (9)$$

where π_{ij} ($j = 1, \ldots J + 1$) is the probability of choosing provider j and self-care is one of the $J + 1$ alternatives (Hoffman and Duncan, 1988).

In the CLGT model, the explanatory variables have different values in each alternative but these do not (do) pose a problem because the observational values of variables representing provider (individual) characteristics are not (are) constant across alternatives. To allow for the effects of individual characteristics, these characteristics are first converted to become alternative-specific variables by creating a set of dummy variables for the alternatives and then interact these characteristics with the dummy variables. To avoid the dummy variable trap, the dummy variable for one of the alternatives must be dropped. Since the usual pratice is to normalize health production with self-care as the "normalizing" alternative, the dummy for self-care is dropped; thus, the quality of a particular provider care is measured relative to the efficacy of self-care.

The CLGT model assumes independence of irrelevant alternatives (IIA), that the odds ratios $\Omega ij/\Omega ik$ are independent of the other alternatives. This IIA assumption follows from the initial assumption that the random shocks are independent across choices. To test the validity of this assumption, this study employs the IIA test developed by Hausman and McFadden (1984). Under the null hypothesis of IIA, the CLGT estimates of a subset of the choices are consistent but not efficient whereas under the alternative hypothesis they are inconsistent. The test therefore compares estimates of the full spectrum and of a subset of choices. The statistic is

$$H = (b_s - b_f)'[V_s - V_f]^{-1}(b_s - b_f) \sim \chi^2_K, \quad (10)$$

χ^2_K where K is the number of explanatory variables while b_s (b_f) are the coefficient estimates and V_s (V_f) are the associated estimated covariance matrices for the restricted (full) set of choices.

3. Data

3.1 Background

The Philippine health delivery system is a mix of private and public networks. The private sector, which is a loosely-linked network of mainly medical facilities, delivers more of the direct personal health care that is curative and rehabilitative in nature (Griffin et al. (1994)). The government sector, on the other hand, operates through a mechanism of referrals and provides a wide range of preventive, curative and rehabilitative services, mostly aimed toward low-income groups.

The major provider of health care in the government sector is the Department of Health, which operates field health units - puericulture or

birth centers, rural health units and barangay (i.e., village or city district) health stations, and special health program units - and hospitals. The primary health care facilities, the field health units, usually refer more complicated cases to government hospitals such as district hospital, provincial hospital, and regional hospital. The government also has a small number of medical centers, mostly located in Metro Manila, which provide more specialized health care. In addition, the government focuses on the preventive and promotive aspects of health care delivery by implemnting, through the field health units, a number of public health packages and programs (Azurin, (1988); Herrin et al. (1993)).

3.2 Sample

This study utilizes data from the 1981 Philippine National Health Survey, which contains information not only on socio-economic variables but also on morbidity and health care utilization for those who recovered during the preceding week, regardless of the onset of illness.[5] The sample chosen consists of 430 adults living in urban/rural areas in all the thirteen regions in the Philippines. Some descriptive statistics are presented in Table 1.

3.3 Variable definitions

The three health care alternatives considered in this study are: home care, care in a public facility, and care in a private facility. Home care is the self-care alternative, which consists of no consultation/medication, self-medication, and attendance by a barangay or indigenous health worker (Gertler, Locay, and Sanderson (1987)). Half of the sample of adults resorted to home care, and 26% and 24%, repectively, went to public and private alternatives.

Income is measured as average monthly family income, where family means extended family. Income is that of the family because a family member is not granted or refused health care on the basis of his/her own income and it is monthly because it is more in scale with the cost of one outpatient visit than annual income. Since income does not vary by alternative, variation in prices across alternatives are used to identify and estimate the coefficients on the consumption and consumption squared terms.

The monetary price of a health care is constructed using the amount individuals reported paying for their initial consultation (Gertler and van der Gaag (1990). The survey simply asks for a single total amount that the patient incurred (and that figure supposedly includes professional fees, laboratory expenses, medicine, ambulance and/or transportation expenses). Monetary price is constructed in a similar manner in the literature, i.e., all out-of-pocket expenses usually incurred in making an office visit to the preferred source of health care and cost in resources required in order to receive the service are included.[6] The price of public health care is definitely not zero; patients in government facilities do not pay for professional fees but have to pay for all the other medical expenses unless they are poor, which is determined by a social worker; in some cases, though, doctors give a few free sample drugs. The reported price of home care, such as self-medication and treatment by traditional healers who do home visits, is also not zero.

Due to inavailability of other data - waiting time, treatment time, and wage rate - which are necessary in computing the value of time, the non-monetary portion of total price is measured only by travel time. While travel time to the facilities does not differ much between public and private health

facilities, monetary price does differ more widely. This is not surprising in a country with an unequal income distribution such as the Philippines.

The total price of a health care includes both monetary (direct) price and non-monetary (indirect) access cost. Since the survey does not contain data on the wage rate, the value of travel time cannot be computed. Hence, consumption net of expenditure on health care is measured as income less the monetary price of the alternative, and consumption and travel time enter the equations separately.

The individual characteristics are age, education (a dummy indicating whether the household head is at least a high school graduate), sex, family size, seriousness of illness (whether or not absent from school or work for at least a day), and residence (whether urban or rural).

The provider characteristics should also include training and facilities but because of data inavailability, they are represented only by the probability of being attended by a doctor in a particular alternative, which is obtained by first calculating the regional means of the basic dummy variable indicating whether or not the individual was seen by a doctor and then assigning each individual observation its respective regional mean.

3.4 Hedonic price and travel specification

The model requires price for each of the three treatment alternatives - home care, public facility care, and private facility care. But price and travel time data for each individual are available only for the alternative chosen. This is because the survey only gathers information only on the alternative chosen; thus, for the other two alternatives not chosen, there is no information. This study uses the available data on prices of (access to) health care to estimate hedonic price (travel time) equations and impute prices (travel time) for all individuals. A description of the hedonic price and travel time estimation is in Appendix A. Since individuals are more likely to choose low-price alternatives, the observed distribution of prices paid will not be representative of the ex ante distribution of prices. This selectivity bias problem is corrected using the procedures developed by Lee (1983) and by Dubin and McFadden (1984).

4. Results

4.1 Estimation results

The CLGT model is estimated by likelihood procedure. It passes the IIA test at the 0.01 significance level and therefore the conditional logit specification is not rejected.

To make the model as similar as possible to those of Gertler et al., two variables - family size and probability of being seen by a doctor - are excluded, and the model is estimated with the restriction that the price of home care is zero and the rationale is that the money spent on care includes self-care which is really a separate category and should not be compared with the price of medical care. The results, presented in Table 2, support those of Gertler et al.

The coefficients on consumption and consumption squared are significantly different from zero, indicating that the relative prices of the alternatives are relevant to the choice of provider. The signs of the coefficients imply that the conditional utility function is concave in consumption, i.e., the

marginal utility of consumption and, therefore, the marginal rate of subsitution of health for consumption is diminishing but does not become negative in the relevant range; thus, the necessary condition for health to be a normal good is satisfied.

Travel time is a deterrent of provider choice. The travel time coefficient is negative and significant, implying that increases in non-monetary access costs tend to reduce demand for health care.

The coefficients on individual characteristics are all significant and consistent with expectations except for age in the public alternative equation. The coefficient on age is positive in the private alternative equation; hence, adults who are older are more likely to seek modern private medical care than adults who are younger.

Generally, more educated individuals choose higher quality options. However, the coefficient on education is negative, indicating that education decreases the expected productivity of public and private health care relative to home care, perhaps either because more educated people are able to recognize symptoms of an illness early on such that they could implement simple treatment at home before the illness becomes critical or because there is a lack of variation in eductation in the sample.

The coefficient on sex is negative. This means, given an illness, that male adults are more likely to stay at home and that female adults are more likely to seek care in a formal health facility. This result seems inconsistent with the theory that households will invest in the health of their more productive members, usually male adults, but it may be a sign of gender-bias.

Residence has a negative coefficient. Individuals who reside in urban areas are the better informed and, hence, are better able to recognize symptoms of illnesses early and know how to treat simple ones on their own thereby averting the need to go to a provider (Akin, Griffin, Guilkey, and Popkin (1985)).

The coefficient on seriousness of illness is negative, contrary to what is normally expected that the more serious the illness, the more likely individuals are to seek health care. This result may be due to the inappropriateness of the measure for seriousness used in this study, or because among many Filipinos the word serious has the connotation of "no remedy" and thus there is no need for treatment in either private or public alternative.

Using the same data set, the model is also estimated with the price of home care not set equal to zero, as in Akin et al, and the results (see Appendix B) are essentially similar to the results when the price of home care is set equal to zero, as in Gertler et al.[7] In particular, in both cases, price and income do affect the demand for health care. The findings of this study seem consistent with the findings of Gertler and van der Gaag (1990, p. 100) for Peru and Côte d´ Ivoire - that the Akin et al. model where prices and income are entered linearly and the Gertler et al. model yield essentially the same results, implying that the failure of the Akin et al. studies to find significant price and income effects was probably due to problems with data.[8]

4.2 Price elasticities

The demand function for health care yields price elasticities which

provide information on how user fees will affect utilization and access to health care. In addition, since price and income enter the demand functions via the consumption terms in a non-linear form, it is hard to assess the direction and magnitude of their influence on demand simply by looking at the coefficient values. Thus, the price elasticities across income groups (by income quartile) are computed, following Train (1986), as follows:

$$E_{jPj} = [- \alpha_1 - 2\alpha_2(Y - P_j)]P_j(1 - \text{Prob}_j), \qquad (11)$$

where E_{jPj} is the quartile point elasticity of demand for health care from provider j with respect to the price of health care from provider j and Y is the mean income for the quartile. It is an elasticity of probability which indicates the percentage decline in the probability of choosing the alternative - not the percentage decline in the quantity of service demanded or in the number of visits to the provider - associated with a 1 percent increase in price (Greene, 1990).

The computed point price elasticities of demand for adult health care are shown in Table 3. The elasticities are negative over all income groups and their absolute magnitude decreases as income increases. Since demand is more elastic at lower incomes, it follows that poor adults are more price-sensitive than rich adults. These results support those of Gertler et al.

The magnitudes of these price elasticities are not unusual because in the literature price elasticities range from |-0.2| to as "high" as |-2.1| for industrial countries and rise above |-2.1| for developing countries. Price elasticities are higher in developing countries because income levels are substantially lower, medical insurance is almost non-existent, and income elasticities are higher (Gertler and van der Gaag (1990)).

Note also that the magnitudes of these price elasticities for adults are lower than those established for children (Ching, 1995). This is also true in the case of Peru and Côte d' Ivoire (Gertler and van der Gaag (1990)). This implies that children and the poor, as compared to the population in general, will be hurt more by the introduction of user fees.

Since the results imply that an increase in price is more likely to hinder poorer people from choosing a higher price or higher-quality alternative, the government should think twice before imposing user fees, especially uniform across-the-board charges. The regressiveness of user fees suggests that there is a need for research on a sliding scale fee or a price discrimination policy in order to avoid unduly restricting the access to health care on the part of the poor.

5. Conclusion

This paper has investigated the demand for adult health care in the Philippines using a theoretical model that implies a natural interrelation between price and income. The demand function takes on a mixed/conditional logit form. The model is estimated using country-wide data from the 1981 National Health Survey, which has information on price that is collected contemporaneously with the rest of the variables. The model passes the independence of irrelevant alternatives assumption test.

This study has shown that, as in the case of children, price and income do affect the demand for adult health care. Using the same data set, this study has estimated the model without restrictions on the price of home care

and the results show that price and income do affect the demand for health care, implying that the failure of the Akin et al. studies to find significant price and income effects was probably due to problems with data.

The results on price elasticities indicate that the poor are more sensitive to price changes than the rich. The implication is that user fees are regressive and hence would affect adversely the access to health care.

However, the desirability and feasibility of imposing user fees rest not only the findings regarding the price responsiveness of households but also on factors related to health system organization; adding complexity to an already poorly administered hospital collection system might be inappropriate given the limited capacity that now exists for administering the relatively simple systems already in operation. Furthermore, when user fees already exist and if they are increased (consequently reducing demand) accompanied by the hypothecation of the new revenue to increase quality (thus increasing demand), the final effect - both in overall level and in distribution - is ambiguous a priori and therefore is an empirical issue (Griffin (1989), Lewis (1993), and Waddington and Enyimayew (1989)).

This paper has been concerned with the choice of health care provider and access across income groups. In the future, as improved data, theory, and estimation techniques become available, more services including preventive health care could be analyzed. Such research will further help governments to reach members of the community even before the onset of illness and is important because the consequences of lack of health care are lifelong, affecting the individual's lifetime stock of human capital.

Acknowledgements

This paper was made possible by the following individuals and institutions: Martin Gaynor, Jose Encarnacion, Jr., David Reisman, Richard Frank, Paul Gertler, David Salkever, Paul Chandler, Charles Valmadrid, Marilou Ching, University of the Philippines School of Economics, Philippine Center for Economic Development, UPEcon Fondation, WHO Special Programme for Research and Training in Tropical Diseases, Philippine Institute for Development Studies, International Health Policy Program, and participants of Health Economics Seminar at Johns Hopkins University.

Table 1
Descriptive statistics for adults in the Philippines (sample = 430)

Variable	Mean	Standard Deviation
Went to a public alternative[a]	0.26	0.43
Went to a private alternative[a]	0.24	0.43
Stayed at home[a]	0.50	0.50
Monthly family income[b]	784.50	674.78
Price of visit to public alternative[b]	36.62	15.86
Price of visit to private alternative[b]	61.65	20.23
Price of home care[b]	24.50	7.96
Travel time to public alternative[c]	23.67	11.61
Travel time to private alternative[c]	17.63	6.35
Age	38.73	18.19
Education of household head (high school)[a]	0.28	0.45
Family size	6.81	3.06
Male[a]	0.48	0.50
Seriousness of illness[a]	0.37	0.48
Urban[a]	0.43	0.50
Prob. of being seen by a doctor in public alternative	0.58	0.21
Prob. of being seen by a doctor in private alternative	0.98	0.04
Prob. of being seen by a doctor at home	0.08	0.10

[a] Dummy variable (= 1 if answer is yes, = 0 otherwise).

[b] In Philippine pesos. The 1981 exchange rate was approximately P8/U.S. dollar.

[c] In minutes.

Table 2
Mixed/conditional logit model of provider choice estimates for adults in the Philippines with the price of home care set to zero

Variable	Coefficient	t-ratio
All Alternatives[a]		
Consumption	0.32	72.65
Consumption square	-0.26×10^{-5}	-1.80
Travel time	-0.51	-54.64
Public Alternative[b]		
Age	0.00	1.30
Education of household head	-2.40	-9.54
Male	-3.61	-16.28
Seriousness of illness	-2.85	-12.53
Urban	-7.65	-32.45
Constant	28.93	125.40
Private Alternative[b]		
Age	0.03	5.38
Education of household head	-0.98	-3.85
Male	-1.47	-6.58
Seriousness of illness	-8.94	-41.35
Urban	-9.50	-40.78
Constant	36.33	155.34

[a] Only a single coefficient is estimated for each explanatory variable whose observational values vary across alternatives in the mixed/conditional logit model.

[b] A set of J coefficients is estimated for each explanatory variable whose observational values do not vary across alternatives in the mixed/conditional logit model, where $J+1$ is the number of alternatives.

Table 3
Point price elasticities for adults in the Philippines, by income quartile

	Income Quartile			
	1 (lowest)	2	3	4 (highest)
Public Alternative	-1.35	-1.34	-1.32	-1.24
Private Alternative	-2.33	-2.32	-2.28	-2.11

Notes

[1] This study and those of Akin et al. are both about the Philippines; however, this study uses national, not regional, data; in addition, this study uses data on the price of home care which are contemporaneously gathered with the rest of the variables. On the other hand, this study differs from those of Gertler et al. in that this study has data on price for home care.

[2] A limitation of the Gertler et al. model is that health status is treated as exogenous. Consumption of health care leads to better health but - as usual in the type of data sets used - health status and health care utilization are observed at the same time (Behrman and Deolalikar, (1988)). In addition to allowing health status to be endogenous, health status information obtained prior to the health care demand data may be used (Manning, Newhouse, and Ware (1982); Cebu Study Team (1992)). Conditional demand equations, i.e., conditional upon current health status, as in Akin et al. may also used but that does not solve the endogeneity problem. Hence, there is a need for collecting historical or restrospective data on individuals and households.

[3] The value of time, ideally, should equal the opportunity cost of time (proxied by the wage rate) multiplied by time spent in obtaining care (the sum of travel time, waiting time, and treatment time) and should enter via the budget constraint where the full price (equal to $P_{i,j}$ plus the value of time), not simply $P_{i,j}$, is used, instead of having $T_{i,j}$ alone enter the utility function as in (1). However, due to data constraint, the theoretical model has specified nonmonetary access cost as $T_{i,j}$ in the utility function instead of the value of time in the budget constraint.

[4] Another limitation of the Gertler et al. model is that, since it is a model of provider choice (i.e., initial choice of provider), it is appropriate only if the choice involves a fixed amount of use. If the amount of use can be varied, then income and price should enter separately, where the latter should vary across types of treatment setting, as in the net variable (income minus price or cost of health care) formulation. This study has the same limitation because the only information available is on the first-consulted facility and no data are available on the number of visits.

[5] The 1987 National Health Survey is already available for public use but it does not contain information on price (or medical expense) and travel time. Both the 1981 and 1987 surveys do not have information on the wage rate.

[6] Ideally, the price of health care should be the expected price of the initial consultation since it is the perceived rather than the actual price which is relevant in explaining ex ante household behavior. But the ex ante perceived price is not usually obtained in surveys, and it is difficult to measure price ex post since the household's perceptions will have been revised through the experience of utilization. Also, ideally, data should be per unit of service price but this approach tends to break down when large numbers of categories are being analyzed; providers differ in many ways and health care consists of a large number of different types of services or procedures.

[7] Gertler et al., regardless of how they define self-care (i.e., no care, or care delivered by traditional healers or pharmacists, or no consultation), have set its price equal to zero; Akin et al. on the other hand have data on the price of home care delivered by relatives, traditional healers, public practitioners, or private practitioners.

[8] Estimation of a demand model where income, price, and income-price interaction variable enter separately (Ching (1992)) yields results similar to the results of this study.

Appendix A
Hedonic price and travel time estimation

The hedonic price equation specifies the price of a single visit to a facility as a function of individual characteristics (seriousness of illness, age, sex, and residence), market variables (number of doctors, population, and probability of being seen by a doctor, which are indicators of the competitiveness of a facility in the region in which the individual lives), and selection correction terms but not of income in order to avoid ascribing higher prices to adults of higher income families who purchased higher quality health care. The hedonic travel time equations, on the other hand, specify the travel time to a facility as a function of individual's residence and also of market variables and selection correction terms.

The correction terms are derived, following correction procedures for sample selection bias developed by Lee (1983) and Dubin and McFadden (1984), by first estimating a reduced form multinomial logit model of provider choice, from which a set of correction terms are constructed for each individual. In particular, this study uses the LIMDEP computer program, which is in line with the methodology developed by Lee when it comes to computing an estimator for the sample selection model. For details, see Ching (1995, Appendix).

The estimated coefficients and t-statistics for the hedonic price and travel time regressions for both public and private facilities are presented in Table A1. Coefficients with very low values but with high t-ratios and many coefficients with low t-ratios are not uncommon. For instance, in Gertler et al.'s Peru study, the market variable coefficient is very low (-0.00) but significant, and many t-ratios are very low (as low as 0.12). Note that the estimation of the hedonic price equations is simply a preliminary step done to impute prices (travel time) for all individuals.

Table A1
Hedonic price and travel time regressions for adults in the Philippines

Independent Variables	Public Price	Private Price	Home Price	Public Travel Time	Private Travel Time
Constant	-0.76	-0.73	1.10	0.16	3.03
	(-0.11)	(-0.13)	(0.87)	(0.47)	(0.67)
Age	0.02	0.19×10^{-2}	0.40×10^{-2}		
	(1.15)	(0.30)	(0.36)		
Seriousness of illness	0.23	-0.47	-0.14		
	(0.70)	(-1.96)	(-0.49)		
Male	0.32	-0.06	-0.15		
	(0.67)	(-0.28)	(-0.78)		
No. of docs. in region	0.27×10^{-3}	-0.47×10^{-3}	-0.53×10^{-3}	-0.81×10^{-3}	-0.18×10^{-2}
	(0.08)	(-0.48)	(-0.43)	(-0.60)	(-2.25)
Regional pop.	0.14×10^{-4}	0.82×10^{-3}	-0.28×10^{-3}	0.94×10^{-4}	-0.35×10^{-3}
	(0.01)	(0.74)	(-0.28)	(0.10)	(-0.38)
Regional pop. squared	-0.33×10^{-7}	-0.88×10^{-7}	0.49×10^{-7}	0.29×10^{-8}	0.61×10^{-7}
	(-0.25)	(-0.70)	(0.44)	(0.03)	(0.58)
Urban	-0.30	-0.29	-0.20	-0.54	-0.20
	(-0.62)	(-1.15)	(-0.85)	(-2.39)	(-0.97)
Prob. seen by doc. in public alt.	-1.21	-2.00	1.53	-0.79	1.26
	(-0.44)	(-1.08)	(0.80)	(-0.57)	(0.82)
Prob. seen by doc. in private alt.	3.03	5.01	0.79	2.48	-0.70
	(0.58)	(1.12)	(0.19)	(0.83)	(-0.19)
Prob. seen by doc. at home	6.84	3.89	-2.41	-0.95	-2.06
	(1.22)	(0.99)	(-0.60)	(-0.33)	(-0.62)
Public selection term	0.87			0.88	
	(0.38)			(1.42)	
Private selection term		-0.42			0.89
		(-0.62)			(2.29)
Home selection term			1.10		
			(0.87)		

Note: t-statistics in parenthesis.

Appendix B
Mixed/conditional logit model of provider choice for adults in the Philippines with the price of home care not set equal to zero

The model is also estimated without the restriction that the price of home care is equal to zero, as in Akin et al, which can be justified by the fact that the money spent on home care includes price of medical care delivered at home. The estimated coefficients and the corresponding t-statistics are presented in Table B1.

The results for age, education (except in the public alternative equation), sex, seriousness, residence, and travel time without price restrictions are similar to those when the price of home care is set equal to zero. Two variables excluded in the model with price restriction but are now included are probability of being seen by a doctor and family size.

The coefficient on the probability of being seen by a doctor is significant but negative, contrary to expectation. This is probably because, although patients are not expected to give explicit payments to the doctor in public facilities, they are expected to give payments-in-kind, a practice not uncommon in rural areas. Since payments-in-kind are not reported, this variable, probability of being seen by a doctor, captures the deterrent effect of such implicit payments; hence, the greater the likelihood that a doctor will be on duty to provide health care in a facility, the less likely people are to visit the facility.

The sign of the coefficient on family size can be positive or negative (Akin, Griffin, Guilkey, and Popkin (1985)). The coefficient on family size is negative though insignificant in the public alternative equation; however, it is positive and significant in the private alternative equation, perhaps because the biological effects of increased family size contributes to a higher level of health need and/or because the income effect of larger family size directs demand toward services of a higher perceived quality care such as private facility care and thus, for users of private facilities, family care is not a subsitute for formal care.

The coefficients on consumption and consumption squared are significantly diffrent from zero. The significance of these coefficients indicates that prices influence choice while the significance of the coefficient on consumption squared indicates that income does influence the choice of health care, i.e., that the utility function exhibits non-constant marginal rate of substitution of health for consumption. Unlike the result when the price of home care is restricted to equal zero, here the coefficient on consumption is negative while that of consumption squared is positive. This result is reminiscent of the Akin et al. (Akin, Griffin, Guilkey, and Popkin (1985)) result that the public price coefficient for public practitioner alternative equation is positive and significant. However, it should be noted that this result is not strange because theory does not tell what the proper signs of these coefficients should be. What this result implies is that the conditional utility function is not concave in consumption, i.e., the marginal rate of subsitution of health for consumption is not diminishing, and therefore the necessary condition for health to be a normal good is not satisfied. Nevertheless, since these coefficients are significant, price and income do affect the demand for health care.

Table B1
Mixed/conditional logit model of provider choice estimates for adults in the Philippines with the price of home care not set equal to zero

Variable	Coefficient	t-ratio
All Alternatives[a]		
Consumption	-0.07	-2.01
Consumption square	0.65×10^{-4}	9.39
Travel time	-1.59	-39.96
Prob. of being seen by a doctor	-25.68	-10.62
Public Alternative[b]		
Age	0.03	1.35
Education of household head	-1.66	-1.78
Male	-13.11	-15.92
Family size	-0.13	-0.96
Seriousness of illness	-9.98	-13.29
Urban	-25.93	-24.06
Constant	86.56	98.71
Private Alternative[b]		
Age	0.05	2.06
Education of household head	-7.43	-7.64
Male	-7.17	-9.04
Family size	1.28	9.93
Seriousness of illness	-21.57	-22.93
Urban	-23.84	-26.53
Constant	87.56	98.28

[a] Only a single coefficient is estimated for each explanatory variable whose observational values vary across alternatives in the mixed/conditional logit model.

[b] A set of J coefficients is estimated for each explanatory variable whose observational values do not vary across alternatives in the mixed/conditional logit model, where $J+1$ is the number of alternatives.

References

Akin, J.S., C.C. Griffin, D.K. Guilkey, and B.M. Popkin, 1985, The demand for primary health services in the third world (Rowman & Allanheld, New Jersey).
Akin, J.S., C.C. Griffin, D.K. Guilkey, and B.M. Popkin, 1986, The demand for primary health care services in the Bicol Region of the Philippines. Economic Development and Cultural Change 34, 755-782.
Azurin J.C., 1988, Primary health care: innovations in the Philippine health system, 1981-85 (Souvenir Publications, Quezon City).
Behrman J.R. and A.B. Deolalikar, 1988, Health and nutrition, in: H.B. Chenery and T.N. Srinivasan, eds., Handbook of development economics (North-Holland, Amsterdam).
Cebu Study Team, 1992, A child health production function estimated from longitudinal data, Journal of Development Economics 38, 323-351.
Ching P., 1995, User fees, demand for children's health care and access across income groups: The Philippine case, Social Science and Medicine 41, 37-46.
Ching P., 1992, Factors affecting the demand for health services in the Philippines, Philippine Institute of Development Studies Working Paper Series No. 92-06 (Philippine Institute of Development Studies, Makati).
Dor P., and J. van der Gaag, 1987, Non-price rationing and the choice of medical care providers in rural Côte d' Ivoire, Journal of Health Economics 6, 291-304.
Dubin J.A. and D.L. McFadden, 1984, An econometric analysis of residential electric appliance holdings and consumption, Econometrica 52, 365-362.
Gertler P., L. Locay, and W. Sanderson, 1987, Are user fees regressive? The welfare implications of health care financing proposals in Peru, Journal of Econometrics 36, 67-88.
Gertler P. and J. van der Gaag, 1990, The Willingness to pay for medical care: evidence from two developing countries (Johns Hopkins University Press, Baltimore).
Greene W.H., 1990, Econometric analysis (MacMillan, New York).
Griffin, C.C., 1989, User charges for health care in principle and practice, Economic Development Institute Seminar Paper No. 37 (World Bank, Washington, DC).
Griffin C.C., B. Alano, M. Ginson-Bautista, and R.M. Gamboa, 1994, The private medical sector in the Philippines: the current situation and prospects for change, Health Finance Development Monograph 4 (Department of Health, Republic of the Philippines).
Hausman J. and D.L. McFadden, 1984, A specification test for the multinomial logit model, Econometrica 52, 1219-1240.
Herrin A.N., A.de la Paz Kraft, O.F. Picazo, O.C. Solon, M.M. Taguiwalo, and M.S. Zingapan, 1993, Health sector review: Philippines, Health Finance Development Project Monograph 3 (Department of Health: Republic of the Philippines).
Hoffman S.D. and G.J. Duncan, 1988, Multinomial and coditional logit discrete-choice models in demography, Demography 25, 415-427.
Lee L., 1983, Generalized econometric models with selectivity, Econometrica 51, 507-512.
Lewis A.L., 1993, User fees in public hospitals: comparison of three country case studies, Economic Development and Cultural Change 41, 513-532.
Manning W.G., J.P. Newhouse, and J.E. Ware, 1982, The status of health in demand estimation; or, beyond excellent, good, fair, and poor, in: V.R. Fuchs, ed., Economic aspects of health (The University of Chicago Press, Chicago).

McFadden D.L., 1981, Econometric models of probabilistic choice, in: C.F. Manski and D.L. McFadden, eds., Structural analysis of discrete data with econometric applications (MIT Press, Cambridge, Mass.).
Schwartz J.B., J.S. Akin, and B.M. Popkin, 1988, Price and income elasticities of demand for health care: the case of infant delivery system in the Philippines, The World Bank Economic Review 2, 49-76.
Train K., 1986, Qualitative choice analysis: theory, econometrics, and an application to automobile demand (MIT Press, Cambridge, Mass.).
Waddington C.J. and K.A. Enyimayew, 1989, A price to pay: the impact of user charges in Ashanti-Akim district, Ghana, International Journal of Health Planning and Management 4, 17-47.
World Bank, 1987, Financing health services in developing countries: an agenda for reform (World Bank, Washington, DC).