The Substitutability of Public and Private Health Care for the Treatment of Children in Pakistan
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The Substitutability of Public and Private Health Care for the Treatment of Children in Pakistan
The Living Standards Measurement Study

The Living Standards Measurement Study (LSMS) was established by the World Bank in 1980 to explore ways of improving the type and quality of household data collected by statistical offices in developing countries. Its goal is to foster increased use of household data as a basis for policy decisionmaking. Specifically, the LSMS is working to develop new methods to monitor progress in raising levels of living, to identify the consequences for households of past and proposed government policies, and to improve communications between survey statisticians, analysts, and policymakers.

The LSMS Working Paper series was started to disseminate intermediate products from the LSMS. Publications in the series include critical surveys covering different aspects of the LSMS data collection program and reports on improved methodologies for using Living Standards Survey (LSS) data. More recent publications recommend specific survey, questionnaire, and data processing designs, and demonstrate the breadth of policy analysis that can be carried out using LSS data.
The Substitutability of Public and Private Health Care for the Treatment of Children in Pakistan

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The World Bank
Washington, D.C.
ABSTRACT

To evaluate how imposing or raising user fees at government health care facilities will affect access to medical care, the distribution of effects across income groups as well as the availability of other providers of medical care must be considered. This study uses a nested multinomial logit model to study the substitutability of public and private care providers in the treatment of children's illnesses in urban Pakistan. Although the poor are more price responsive than the general population, reduced use of government clinics following a price rise will lead to greater use of private care providers rather than to an increase in self-care or the forgoing of care. Thus the private sector is likely to handle most of the patients who shift away from publicly provided health care following an increase of user fees in urban Pakistan, provided that prices do not rise in the private sector because of increased demand.
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1. INTRODUCTION

Providing access to medical care, especially for children, has been a priority for many developing countries. This concern has led many governments to establish large public health care systems that provide medical care free of charge (de Ferranti 1985). The recent financial crisis in the third world has induced many of these governments and international donor agencies to reevaluate the policy of free access and to consider charging user fees for medical care (World Bank 1988). Proponents of this policy argue that user fees will raise substantial revenues that can be reinvested to improve the medical care system and will improve allocative efficiency by moving prices closer to marginal cost (de Ferranti 1985, Jimenez 1987, World Bank 1988). These suggestions have not always been well received since the provision of free care is often a goal in and of itself, and some have argued that user fees will cause substantial reductions in medical care utilization, especially among the poor (Cornea, Jolly, and Stewart 1987, Gilson 1988).

An often ignored aspect of the user fee debate is the availability of other private nongovernment sources of medical care. If there is a private care alternative, then raising user fees at public facilities may cause some substitution of private care for public care rather than driving people completely away from health care. Thus the existence of private medical care may mitigate the impact of public sector user fees on the utilization of medical care. The extent to which substitution versus nonutilization takes place depends, in part, on the cross-price elasticity of demand.¹

¹/ Pitt (1983) and Pitt and Rosenzweig (1985) indicate the importance of such substitution among food items in determining nutrient intake.
In this paper, we evaluate **ex ante** the likely effects of raising user fees on the utilization of medical care for the treatment of young children's illnesses in urban Pakistan. The evaluation is conducted by estimating a model of the demand from medical care from which we simulate the probable effects of raising user fees. While models of the general demand for medical care in developing countries have been estimated,\(^2\) little specific work has been done on the demand for medical care to treat young children's illnesses. Given the vulnerability of children to disease and the responsiveness of acute illness to prompt treatment, this is a crucial element of the evaluation of user fees.

Pakistan itself is a good choice for this study. Mortality and morbidity rates in Pakistan, particularly among children, are high relative to its poorer neighbors (Sathar 1987, World Bank 1987). Also, the Pakistan government faces a large and growing federal budgetary deficit, and has considered raising user fees (Government of Pakistan 1987). Moreover, Pakistan has a large well-developed private sector that allows to evaluate how the existence of a private sector might reduce the negative utilization effects of user fees.

To quantify the effect of user fees on utilization, we estimate a nested multinomial logit (NMNL) model of medical care provider choice explicitly derived from a utility maximizing theoretical model. Unlike the

more popular multinomial logit used by many to estimate medical care provider choice models, the NMNL does not impose constant cross-price elasticities. This allows us to determine if private and public care are closer substitutes than public and self-care. In addition, our specification is flexible enough to allow price elasticity to vary by income so that we can investigate the distributional effects of user fees.
2. A MODEL OF THE DEMAND FOR MEDICAL CARE

Our framework is a model in which utility depends on health and on the consumption of goods other than medical care. In this study, we only consider primary curative medical care. If an illness or accident is experienced, individuals must decide whether or not to seek medical care. The benefit from consuming medical care is an improvement in health, and the cost of medical care is a reduction in the consumption of other goods.

Individuals have to decide not only whether to seek care but also what type of care. They are able to choose from a finite set of alternative providers, one of which is self-treatment. Each provider offers an expected improvement in health (efficacy) for a price. Let us define the quality of an alternative provider as the expected improvement in health as a result of that provider's medical care. Based on this as well as information on prices and incomes, individuals choose the alternative that yields the highest utility.

Formally, let the expected utility conditional on receiving care from provider \( j \), be given by

\[
U_j = U(H_j, C_j),
\]

where \( H_j \) is expected health status after receiving treatment from provider \( j \), and \( C_j \) is consumption net of the cost of obtaining care from provider \( j \).

The quality of provider \( j \)'s medical care is defined as the expected improvement in health relative to the health that an individual would expect if he or she treated him or herself. Let \( H_0 \) be expected health status without professional medical care (i.e., self-treatment). Then, the quality of
provider j's care is \( Q_j = H_j - H_0 \), which yields an expected health care production function of the form

\[
H_j = Q_j + H_0
\]  \hspace{1cm} (2)

Quality, as specified, varies by provider. It is not an objective measure, however, but an individual assessment of the expected improvement in health. As such, it may also vary by individual characteristics such as health status and education.

The health production function assumes a simple form for the self-care alternative. Under this alternative, \( H_j = H_0 \), implying that \( Q_0 = 0 \). This implicitly normalizes the health care production function so that the quality of a particular provider's care is measured relative to the efficacy of self-care.

Consumption expenditures (net of medical care) are derived from the budget constraint. Let \( P_j \) be the price of provider j's care and \( Y \) be income, so that the budget constraint is

\[
Y = C_j + P_j
\]  \hspace{1cm} (3)

with \( C_j \geq 0 \) required for the jth alternative to be feasible. Substitution of (3) into (1) for \( C_j \) yields the conditional indirect utility function

\[
U_j = U(H_j, Y - P_j)
\]  \hspace{1cm} (4)
Notice that income affects utility through the consumption term, and that the price of medical care is foregone consumption.

We are now ready to specify the utility maximization problem. Suppose the individual has J+1 feasible alternatives (with the j = 0 alternative being self-care). The unconditional utility maximization problem is

$$U^* = \max(U_0, U_1, \ldots, U_J)$$

(5)

where $U^*$ is maximum utility. The solution to the utility maximization problem gives the alternative that is chosen, and when there are stochastic terms present, the probability that an alternative is chosen can be interpreted as a demand function in a discrete choice model.
3. EMPIRICAL SPECIFICATION

The demand for a particular alternative is the probability that the alternative yields the highest utility among all the alternatives. The functional form of the demand functions, therefore, depends on the functional form of the conditional utility function and the distribution of stochastic terms.

Particular care must be taken in the specification of the conditional utility function. It is necessary that the specification does not a priori rule out influences that are intuitively plausible determinants of the choice of medical care. Certler et al. (1987) show that income can influence the choice of provider only if the conditional utility function allows for a non-constant marginal rate of substitution of health for consumption. Since income is a logical determinant of the choice of provider, we need to choose a tractable functional form that does not impose a non-constant marginal rate of substitution. One such form is the semi-quadratic, in which utility is linear in health and quadratic in consumption. Specifically, let the conditional utility function be

\[ U_j = \alpha_0 H_j + \alpha_1 C_j + \alpha_2 C_j^2 + \varepsilon_j \]  

(6)

where \( \varepsilon_j \) is a zero mean random taste disturbance with finite variance and is uncorrelated across individuals and alternatives.

Using (3) and (4), we get an expression for consumption net of health care costs
\[ C_j = Y - P_j \]  \hspace{1cm} (7)

where \( P_j \) is the payment to provider \( j \). Substitution of (7) into (6) yields

\[ U_j = \alpha_0 H_j + \alpha_1 (Y - P_j) + \alpha_2 (Y - P_j)^2 + \epsilon_j \]  \hspace{1cm} (8)

for the non-self care alternatives. Under the self-care alternative, \( P_0 = 0 \), implying that the conditional utility function in (8) reduces to

\[ U_0 = \alpha_0 H_0 + \alpha_1 Y + \alpha_2 Y^2 + \epsilon_0 \]  \hspace{1cm} (9)

for the self-care alternative.

The identification of the parameters in (8) requires that the values of expected health and consumption differ across the alternatives. The alternative that a household chooses is the one that yields the highest expected utility. Therefore, if the contribution of either expected health or consumption to utility is constant across alternatives, they cannot influence which alternative is chosen.

If we had assumed a linear utility function, which imposes a constant marginal rate of substitution, the third term on the right-hand sides of (8) and (9) would not be present. The contribution of income to utility would then reduce to \( \alpha_1 Y \), which is constant across alternatives, although not necessarily across households. Since only differences in utility influence a household's choice of provider, income would not be allowed to influence which alternative is chosen. The quadratic consumption term includes a price-income
interaction whose value is not constant across alternatives, and therefore is not differenced out of the model. This price-income interaction allows price effects to vary by income.\(^3\)

The remaining issue in the specification of the conditional utility function is the measurement of the expected efficacy (quality) of each alternative. Substitution of the health production function (2) into the conditional utility function (8) yields

\[
U_j = a_0 H_0 + a_0 Q_j + a_1 (Y - P_j) + a_2 (Y - P_j)^2 + \epsilon_j
\]  

(10)

Since \(Q_j\) has been normalized to 0, the conditional utility function in (9) for the self-care alternative reduces to

\[
U_0 = a_0 H_0 + a_1 Y + a_2 Y^2 + \epsilon_0
\]  

(11)

The \(a_0 H_0\) term appears in all the conditional utility functions, and its value is constant across alternatives. Since only differences in utility influence preference ordering, this term can be ignored.

Quality \((Q_j)\) is not directly observable. We solve this problem by letting \(Q_j\) be a parametric function of its observable determinants. The

\[^3\] Some authors try to include income in the model by allowing alternative specific coefficients on consumption. Identification in this specification requires that two options that have the same quality and price must yield different levels of utility. Thus, preferences are not well ordered and transitive. This implies that stable utility functions do not exist for this model.
expected quality of provider \( j \)'s care is the expected improvement in health (marginal product) over the expected level of health that would occur from self-treatment. The expected improvement in health can be viewed as being produced through a household production function. The arguments of the household production function include characteristics of the health care provider as well as individual characteristics such as health status and ability to implement the recommended treatment plan. For example, the expected improvement in health from hospital care relative to self-care may be increasing in education, since individuals with higher education may be better able to implement recommended treatment plans. For this study, we also use the distance to the provider as an argument in the health improvement production function.

The marginal utility of an individual's health may vary by family. For example, the marginal utility of the health of a child may depend on how many children there are in the household. In general, the value of health may vary with many demographic variables such as age, sex, education, and family composition.

The basic determinants of both the quality household production function and the marginal utility of quality are demographic variables. Pollak and Wachter (1975) argue that the separate effects of demographic variables in the household production function and in the marginal utility of quality cannot be identified. We, therefore, specify a reduced form model of the utility from quality. Formally, let the utility from quality be given by

\[
\alpha_0 Q_j = \beta_0 + \beta_1 x + \eta_j, \tag{12}
\]
where $X$ is a vector of demographic variables and $\eta_j$ is a zero mean random disturbance with finite variance.

To make the specification as general as possible, we let the coefficients in (12) vary by alternative. Allowing for different intercepts permits the baseline quality to vary by alternative, and having different slope coefficients allows the provider's productivity relative to self-care to vary with individual characteristics such as age, education, and severity of illness. The random disturbance captures unmeasured portions of the quality function such as severity of illness. These disturbances may be correlated across alternatives.

Since $Q_0 = 0$, the utility from quality simplifies to $a_0 Q_0 = 0$ for the self-care alternative. Hence, the coefficients in (12) are interpreted relative to the self-care alternative. Notice further that the normalization sets the unobserved portion of quality in the self-care alternative, $\eta_0$, to zero.

Substitution of (12) into the conditional utility functions in (10) yields

$$ U_j = V_j + \eta_j + \epsilon_j, $$

where

$$ V_j = \beta_0 j + \beta_1 j X + \alpha_1 (Y - P_j) + \alpha_2 (Y - P_j)^2 $$

(14)

Notice that the intercept and coefficients on the demographic variables vary by alternative, whereas the coefficients on the economic variables are constant across alternatives. Further, the disturbances in the non-self-care
conditional utility functions are correlated with each other but are uncorrelated with the disturbance in the self-care conditional utility function.

The final step towards estimation is the specification of the stochastic distribution. The stochastic specification allows us to solve for the demand functions by computing the probability that the expected utility from choosing a provider is higher than the utility from any of the other alternative. Most of the previous studies on the demand for medical care in developing countries have assumed that these demand functions take on a multinomial logit (MNL) form. The MNL suffers from the Independence of Irrelevant Alternatives assumption (McFadden 1981). This assumption is equivalent to assuming that the stochastic portions of the conditional utility functions are uncorrelated across alternatives, and imposes the restriction that the cross-price elasticities are the same across alternatives. A computationally feasible generalization of the MNL is the Nested Multinomial Logit (NMNL), which was introduced by McFadden. The NMNL allows for correlation across subgroups of alternatives and, therefore, non-constant cross-price elasticities across subgroups.

There are four medical care choices in this study; let choice 0 be self-care, choice 1 be public clinics, choice 2 be the chemist, and choice 3 be private doctor. The $\eta_j$'s imply that the non-self-care alternatives may be correlated with each other, but not with the self-care alternative. Therefore, the self-care demand function (i.e., the probability of choosing self-care) is
\[ \Pi_0 = \frac{\exp(V_0)}{\text{wexp}(V_0) + \left[ \exp(V_1/\sigma) + \exp(V_2/\sigma + \exp(V_3/\sigma) \right]} \]  

and the probability of choosing a doctor, chemist, or clinic is

\[ \Pi_i = \frac{\exp(V_i/\sigma)}{\exp(V_1/\sigma) + \exp(V_2/\sigma + \exp(V_3/\sigma)} (i=1,2) \]  

where \( \sigma \) is a coefficient of dissimilarity between the non-self-care and the self-care conditional utility functions introduced by the \( \eta_j \)'s and the \( V_i \)'s are given in (13) and (14).

McFadden (1981) shows that \( s \) must be between zero and one for the model to be consistent with utility maximization. When \( \sigma \) is less than one, the error terms in the utility functions of the non-self-care alternatives are correlated. This implies that individuals view the non-self-care alternatives as closer substitutes with other than with self-care. When \( \sigma = 1 \), all of the alternatives are viewed as equally close substitutes and the NMNL reduces to an MNL.

Own-price effects enter the demand function via the numerator in (16). Cross-price effects enter via the denominators of (15) and (16).

When \( \sigma \) is less than one, the cross-price elasticities of the non-self-care alternatives are higher than the cross-price elasticities of the self-care alternative.

One refinement that is included in the estimation that is not reported for other studies is in the treatment of cases for which the household reports that a type of provider is not available. Failure to modify
the likelihood function for those cases in which the household choice set is limited by a nonavailability may have a nontrivial impact on estimated relative utilities. The likelihood function is modified by excluding the unavailable options from the denominators of (15) and (16). The numerators are automatically excluded from these options since an unavailable option is never chosen.
4. DATA

The data used for this study come from a 1986 survey of households residing in low-income urban neighborhoods throughout Pakistan (Alderman et al. 1988). Female enumerators interviewed female household members and recorded data on illness by type and associated medical care utilization over the preceding two weeks for each child five years old or under. Also recorded were the availability, costs, and distances of medical services, in addition to socioeconomic characteristics of the household. Moreover, enough information was collected as to be able to calculate total household expenditures which we used as a measure of permanent income. Table 1 reports descriptive statistics of the data used in this study.

A few features of the sample should be noted. Forty-two percent of the total sample of 935 children had either diarrhea or other illness during the previous two weeks. The sample used in this study is conditional on acute morbidity, with surgery and chronic illness being excluded from the study. Since the observations are individuals, not households, larger households have a greater weight in the sample than would be the case in a household-based sample. This explains the large value for average household size.

Private medical care predominates in this sample as well as elsewhere in Pakistan. The 57 percent of cases taken to private doctors is somewhat higher than the 41 percent of all cases (including adult illnesses and surgery) observed in urban Pakistan on a survey conducted in 1987 (Government of Pakistan 1987). Costs per visit are relatively low, in part, due to the nature of childhood illnesses, but are of an expected relative magnitude.
Table 1: Sample values for health care utilization (N=461)

<table>
<thead>
<tr>
<th></th>
<th>Government Clinic</th>
<th>Chemist</th>
<th>Doctor</th>
<th>Sample</th>
</tr>
</thead>
<tbody>
<tr>
<td>Household reporting service available (percent)</td>
<td>82.0</td>
<td>75.9</td>
<td>91.2</td>
<td></td>
</tr>
<tr>
<td>Household using service conditional on illness (percent)</td>
<td>9.4</td>
<td>16.1</td>
<td>56.9</td>
<td></td>
</tr>
<tr>
<td>Cost of service in rupees (provincial median values)</td>
<td>9.8 (5.08)</td>
<td>17.0 (7.42)</td>
<td>20.7 (3.3)</td>
<td></td>
</tr>
<tr>
<td>Travel time to provider (hours)</td>
<td>0.35 (0.36)</td>
<td>0.17 (0.18)</td>
<td>0.22 (0.19)</td>
<td></td>
</tr>
<tr>
<td>Child age (months)</td>
<td></td>
<td></td>
<td></td>
<td>25.7 (16.4)</td>
</tr>
<tr>
<td>Sex (1=male; 0=female)</td>
<td></td>
<td></td>
<td></td>
<td>0.52 (0.50)</td>
</tr>
<tr>
<td>Illness type (1=diarrhea, 0=other)</td>
<td></td>
<td></td>
<td></td>
<td>0.50 (0.50)</td>
</tr>
<tr>
<td>Household size</td>
<td></td>
<td></td>
<td></td>
<td>9.5 (3.2)</td>
</tr>
<tr>
<td>Number of children</td>
<td></td>
<td></td>
<td></td>
<td>2.4 (1.3)</td>
</tr>
<tr>
<td>Family income (rupees/week)</td>
<td></td>
<td></td>
<td></td>
<td>817.5 (689.22)</td>
</tr>
</tbody>
</table>

Note: Standard errors in parentheses.

Consumption net of medical care, consumption squared, and the determinants of the utility from quality must be specified for each alternative. Consumption net of medical care is computed as monthly family income less the price of a consultation. Monthly family income is measured by total family expenditures. Using expenditures rather than earnings allows us to include the value of home production which is a major non-market source of
consumption. Also, expenditures tend to be better measures of permanent income than earnings in developing countries since families smooth consumption over time and earnings, especially among the self-employed, tend to be seasonal and lumpy. The price of each alternative is computed as the median reported price in each region. Consumption and consumption squared are measured in per capita terms. The variables that are included in the utility of quality function are age in months, a dichotomous variable indicating if the child was male, a dichotomous variable indicating whether the child had diarrhea or another illness, and the level of mother's education.

Another non-monetary price of medical care is the time price. In a fully specified model, the time prices would enter the budget constraint and be part of the total price of medical care. There are three reasons why this is not operationally feasible in this case: (1) we would need to measure "full" income which includes the value of leisure, (2) we would have to know the value of time of the person who took the child to get medical care so as to compute the time price, and (3) we would need to know the person, if any, who takes the child for medical care. While the survey attempted to obtain information on the individual who usually accompanies the child to the care giver, most household's indicated that the responsibility was joint. Hence, no value of time could be accurately ascribed to the visits observed.

Moreover, in economies such as Pakistan, where the wage sector is small, the value of time is extremely difficult to compute. This is especially true for women's time; labor force participation of adult women was under 8 percent in this sample. Even fewer worked in the wage sector. By treating time costs outside the monetary budget constraint, we allow the
coefficients of time to pick up any travel costs. Implicitly, we are assuming that time costs do not reduce expenditures but rather come at the expense of leisure. Thus, travel time enters the conditional utility functions as a separate argument.
The provider choice model was estimated by full information maximum likelihood. The estimated coefficients are presented in Table 2.

The value of sigma is significantly different from both zero and one. This is a test of the validity of the model, and indicates that the NMNL is preferred to the MNL. The practical implication of this is that households view the professional choices as closer substitutes with each other than with the self-care alternative. Thus, an increase in user fees at public facilities will cause a greater percentage increase in the demand for private care than for self-care.

The coefficients on the consumption and consumption squared terms are both significantly different from zero, and imply that the conditional utility function is concave in consumption. Prices enter through these terms, and it is the variation in prices that identifies these parameters. If there was no variation in prices across alternatives, then consumption would be constant across alternatives and, therefore, not influence the choice. The signs of the coefficients imply that price effects are negative over the relevant income range, and that the price effects diminish with income.

Due to the nonlinear nature of the model, the magnitudes of the price effects are not directly apparent and, therefore, arc elasticities are calculated. These are presented in Table 3. As implied by the model and the

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4/ A simple two-step estimation procedure does exist as an alternative to full information maximum likelihood (FIML). Hensher (1986) reports large efficiency gains from using FIML over the more popular two-step procedure.
significant term for consumption squared, price elasticities vary by both income and level of the price change. They decline with income and rise with larger price changes. They also vary across alternatives, with demand for private doctors not being particularly sensitive to price changes. These

Table 2: Provider choice model coefficient estimates (N=461)

<table>
<thead>
<tr>
<th>Independent Variable</th>
<th>Coefficient</th>
<th>T-Statistic</th>
</tr>
</thead>
<tbody>
<tr>
<td>Log of consumption ((a_1))</td>
<td>0.187</td>
<td>2.01</td>
</tr>
<tr>
<td>Log of consumption squared ((a_2))</td>
<td>-0.062</td>
<td>1.98</td>
</tr>
<tr>
<td>Travel time</td>
<td>-0.912</td>
<td>2.64</td>
</tr>
<tr>
<td>Sigma</td>
<td>0.518</td>
<td>2.77</td>
</tr>
<tr>
<td>Government clinic</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Constant</td>
<td>1.192</td>
<td>2.35</td>
</tr>
<tr>
<td>Age</td>
<td>-0.001</td>
<td>0.07</td>
</tr>
<tr>
<td>Male</td>
<td>-0.077</td>
<td>0.26</td>
</tr>
<tr>
<td>Diarrhea</td>
<td>-0.439</td>
<td>1.37</td>
</tr>
<tr>
<td>Mother's education</td>
<td>-0.032</td>
<td>0.15</td>
</tr>
<tr>
<td>Chemist</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Constant</td>
<td>1.331</td>
<td>2.84</td>
</tr>
<tr>
<td>Age</td>
<td>0.003</td>
<td>0.44</td>
</tr>
<tr>
<td>Male</td>
<td>-0.358</td>
<td>1.93</td>
</tr>
<tr>
<td>Diarrhea</td>
<td>-0.245</td>
<td>0.76</td>
</tr>
<tr>
<td>Mother's education</td>
<td>0.118</td>
<td>1.78</td>
</tr>
<tr>
<td>Private doctor</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Constant</td>
<td>2.398</td>
<td>5.42</td>
</tr>
<tr>
<td>Age</td>
<td>-0.002</td>
<td>0.28</td>
</tr>
<tr>
<td>Male</td>
<td>-0.436</td>
<td>1.88</td>
</tr>
<tr>
<td>Diarrhea</td>
<td>-0.563</td>
<td>2.06</td>
</tr>
<tr>
<td>Mother's education</td>
<td>0.060</td>
<td>0.63</td>
</tr>
</tbody>
</table>

* The coefficient estimate reflects the fact that consumption squared was divided by 100 for estimation and standardization.
Table 3: Arc price elasticities of demand, by income quintile

<table>
<thead>
<tr>
<th>Income Quintile</th>
<th>Price Change (in Rupees)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>0-10</td>
</tr>
<tr>
<td><strong>Clinic Demand</strong></td>
<td></td>
</tr>
<tr>
<td>1 (lowest)</td>
<td>-0.43</td>
</tr>
<tr>
<td>2</td>
<td>-0.36</td>
</tr>
<tr>
<td>3</td>
<td>-0.33</td>
</tr>
<tr>
<td>4</td>
<td>-0.25</td>
</tr>
<tr>
<td>5 (highest)</td>
<td>-0.03</td>
</tr>
<tr>
<td>Overall</td>
<td>-0.29</td>
</tr>
<tr>
<td><strong>Chemist Demand</strong></td>
<td></td>
</tr>
<tr>
<td>1 (lowest)</td>
<td>-0.36</td>
</tr>
<tr>
<td>2</td>
<td>-0.31</td>
</tr>
<tr>
<td>3</td>
<td>-0.28</td>
</tr>
<tr>
<td>4</td>
<td>-0.21</td>
</tr>
<tr>
<td>5 (highest)</td>
<td>-0.02</td>
</tr>
<tr>
<td>Overall</td>
<td>-0.25</td>
</tr>
<tr>
<td><strong>Private Doctor</strong></td>
<td></td>
</tr>
<tr>
<td>1 (lowest)</td>
<td>-0.13</td>
</tr>
<tr>
<td>2</td>
<td>-0.11</td>
</tr>
<tr>
<td>3</td>
<td>-0.10</td>
</tr>
<tr>
<td>4</td>
<td>-0.08</td>
</tr>
<tr>
<td>5 (highest)</td>
<td>-0.01</td>
</tr>
<tr>
<td>Overall</td>
<td>-0.09</td>
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</table>

Results are comparable to those reported for Peru (Gertler et al. 1987) and for Côte d'Ivoire (Gertler and van der Gaag 1988), but are higher than those found by Akin et al. (1986) for the Philippines. The latter model, however,
did not allow for changes in price responsiveness by income group and is, therefore, less price sensitive.

Cross-price elasticities are also of interest in evaluating the effect of user fees at public health care facilities on the utilization of medical care. The cross-price elasticities of the demand for care at non-government alternatives is presented in Table 4. As expected, demand for chemists and private doctors is more sensitive to the change in user fees at government clinics than is the demand for self-care. The cross-price elasticities are higher for lower income groups and at greater user fee levels. Analogous to Cournot aggregation, price and cross-price effects, weighted by the share in total health care, sum to zero. While the cross-price elasticities for government clinics with changes in private care prices,

<table>
<thead>
<tr>
<th>Income Quintile</th>
<th>Government Clinic Price Change</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Chemist</td>
</tr>
<tr>
<td>Income Quintile</td>
<td>0-10</td>
</tr>
<tr>
<td>1 (lowest)</td>
<td>.059</td>
</tr>
<tr>
<td>2</td>
<td>.045</td>
</tr>
<tr>
<td>3</td>
<td>.039</td>
</tr>
<tr>
<td>4</td>
<td>.027</td>
</tr>
<tr>
<td>5 (highest)</td>
<td>.002</td>
</tr>
<tr>
<td>Overall</td>
<td>.035</td>
</tr>
</tbody>
</table>
are smaller than the own-price elasticity, the private care options are also a larger percentage of total health care utilization.

The coefficient on travel time is negative and significantly different from zero. These results are consistent with theoretical predictions of Becker (1962) and Acton (1975) who argue that time prices matter when monetary prices are small. In addition, the results are consistent with results from Côte d'Ivoire (Dor and van der Gaag 1987), Kenya (Mwabu 1986), and Peru (Gertler et al. 1987).

The results also indicate age neutrality and a tendency to use private doctors less for the treatment of diarrhea than other illness, although they are still the apparent preferred choice. The education of the mother affects the choice of provider only in the case of using chemists relative to self-care. This is plausible. It may be interpreted that more educated mothers feel more confident processing the information of alternative medications of the chemist. There were, however, few educated mothers in the sample, although school enrollment was moderately high for female children. This precludes a more detailed analysis of the interaction of education and other factors.

It is also quite surprising that the sample not only did not indicate bias against taking females to clinics, these girls appear to be favored. This is somewhat at odds with results reported elsewhere about sex bias against females in South Asia (Chen et al. 1981, das Gupta 1987). Moreover, all demographic evidence and anthropological accounts of gender biases for Pakistan imply that Pakistan is similar to its neighbors in this respect. Likewise, our data do not depart from the pattern of more reported males.
surviving in all age groups that has been observed elsewhere. The result here cannot be dismissed as an aberration, however, as it is also consistent with the significantly higher Z-scores for weight-for-height for girls, which are a measure of nutritional status indicated in a multivariate regression on this sample (Alderman et al. 1988). Also note that while the absence of a bias against females is not prominent in the literature, it has been reported elsewhere. Kakwani (1986), for example, found food allocation in the Indian Punjab actually favoring small girls. While the gender bias is not a main focus of our study, this observation can contribute to cataloging of the circumstance where gender bias may or may not be expected.
6. POLICY SIMULATIONS

The estimation results indicate a moderate but inelastic price elasticity of demand which declines with income, and that public and private providers are closer substitutes than public providers and self-care. A direct implication is that higher user fees at government clinics will be able to increase revenues with some reduction of utilization. When user fees are low, poor households are more likely to use public clinics. This differential disappears when user fees are comparatively high. Those who leave government clinics as a result of the increased fees are more likely to switch to private care than to self-care. Thus, the private sector is likely to absorb some of the negative utilization effects of user fees.

To gauge the magnitudes of these effects, we simulate the utilization patterns under plausible user fee regimes. We compare the demand for each type of care when government clinics charge user fees of 0, 10, and 20 rupees. These simulations assume that private providers are price takers and will not adjust their prices in response to the rise in user fees. To allow for a private sector response, we also conduct the simulations under the assumption that private providers raise their prices commensurately with the increase in public user fees.

The simulation results are reported in Table 5. Each row represents the pattern of utilization under a particular user fee scenario. The first two columns indicate the user fee scenario. The simulations are conducted separately for different income groups. Columns 3 through 7 report the results for individuals in the bottom quintile of the income distribution, the
Table 5: Simulation of health care choices

<table>
<thead>
<tr>
<th>Scenario</th>
<th>Lowest Quintile</th>
<th>Highest Quintile</th>
<th>Whole Sample</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td>20.7</td>
<td>12</td>
<td>16</td>
</tr>
<tr>
<td>10</td>
<td>20.7</td>
<td>9</td>
<td>16</td>
</tr>
<tr>
<td>20</td>
<td>20.7</td>
<td>7</td>
<td>17</td>
</tr>
<tr>
<td>20</td>
<td>30.7</td>
<td>9*</td>
<td>24</td>
</tr>
</tbody>
</table>

Note: Calculated holding all other variables as sample mean values. Results do not necessarily add to 100 due to rounding.
next five report the results for the highest quintile, and the percent of all ill individuals who chose each of the alternatives under each price scenario.

Consider first raising user fees at government clinics from 0 to 10 rupees. By comparing row 1 to row 2 in Table 5, we see that the demand for clinic care falls by 25 percent in the lowest income quintile and by 20 percent overall. In the lowest income quintile, two-thirds of those affected switch to private chemist and doctor care and only one-third switch to self-care. Overall the majority of those affected switch to the non-self-care alternatives. This same pattern emerges when prices are increased from 10 to 20 rupees (compare row 2 to row 3).

The above simulations assumed that private providers did not adjust their prices in response to the change in fees at public facilities. In the last simulation, we assume that private doctors raise their prices the same amount that public fees are raised. By comparing rows 2 and 4, we see that many more people are forced into self-care case. Thus, the effectiveness of a private sector mitigating the negative utilization effects of user fees at public facilities depends on how much private providers adjust their prices in response to the demand shift.
7. CONCLUSION

The results indicate a moderate price response for child health care in urban Pakistan and that public and private health care are closer substitutes than public and self-care. A direct implication of the results is that higher user fees will be able to increase revenues with some reduction in use of government clinics, especially among the poor. Those who leave government clinics as a result of the increase in fees are more likely to switch to private care than to forego care. Thus, the private sector is likely to absorb much of the impact of increased user fees in the urban area, provided that this sector does not raise its price in response to the increased demand.
REFERENCES


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