Philippine Review of Economics and Business
Volume XXIII, Nos. 3 & 4, September & December 1986

PUBLIC PROVISION AND DEMAND FOR HEALTH SERVICES: A CASE STUDY OF BICOL

By Panfila Ching*

This study describes the distribution of health subsidies across income groups and the use of health facilities. The first part derives empirical results using a proposed methodology based on the Meerman procedure. The second employs various estimation procedures and provides econometric analyses of the factors behind the use of public facilities. The data set is culled from the 1978 Bicol Multipurpose Survey.

The two parts of this study are seen to be actually related. The first part investigates how the utilization of facilities is distributed across income groups; the rationale for this view is that the distribution of benefits from health facilities is ultimately determined by the distribution of utilization or frequency of visits to the facilities. What determines this frequency is the concern of the second part.

From the first part, one learns that income is not a barrier to access to public health care. Public facilities, in general, did not discriminate against the poor. The second part shows that costs — whether money or time — did not deter the use of health facilities.

Families are found to be responsive to the relative money prices of facilities. While most of the facilities are complements, some are clearly substitutes, e.g., the hilot and puericulture center. Health planners would thus have to continue figuring out how public facilities can establish themselves effectively in a competitive environment.

1. Introduction

There is a growing concern over the distribution of public expenditure and the satisfaction of basic needs. Aside from the unequal distribution of per capita income, there also exists an inequality in the consumption of basic goods and services such as education, health, housing and water. A country that uses public expenditure toward the satisfaction of basic needs and the reduction of poverty should know who receives the resources and why.

---

*This paper is based on the author's Ph.D. dissertation submitted to the UP School of Economics in 1986. The author would like to thank the Philippine Institute for Development Studies for the financial support for two projects (Measuring the Incidence of Health Expenditures I and II) which contributed to the completion of the dissertation; and the Bicol River Basin Development Program and the U.S. Agency for International Development, for the survey data.

The question of "who receives" could be answered by the ıdy of government expenditure incidence. The "why" issue, on e other hand, could be explained by factors affecting the use a basic good or service. The present study is designed to explore ese two issues, among others.

The specific objectives of this study are as follow:

1.1 to propose a methodology for determining the distribution of health benefits across income groups;
1.2 to derive empirical results using the proposed methodology; and
1.3 to provide an empirical analysis of the factors affecting use of health services with the aid of an econometric model.

2. Existing Studies on the Incidence of Government Expenditures

In recent years, a number of studies on the incidence of govrnment expenditures have been carried out. However, studies on ne incidence of health expenditures in particular are lacking

To date, there have been few attempts in the Philippines to ıeasure the effects of government expenditures on the distribution f income. The contributions to this effort are Jayme (1974), the lational Tax Research Center or NTRC (1974) and Tan (1975). lo study has yet tried to update its findings, nor has any of these tudies applied new methodology to measure the incidence of overnment expenditure in the Philippine setting. [1]

Jayme investigated the incidence of twelve government ex-ıenditure items[2] for the years 1961, 1965 and 1971, making use ıf the National Census and Statistics Office's (NCSO) Family Income nd Expenditure Surveys (FIES) which had been conducted during hose years. NTRC also studied the incidence of public expenditures ısing the 1971 FIES. Tan went a step further by conducting a naional survey in 1974 to obtain allocators, i.e., measures of conumption of service, for education, extension services, health ervices, and social welfare assistance.

---

[1] Except for P. Ching, "Measuring the Incidence of Health Expenditures Jsing Secondary Data," 1984, funded by the PIDS.

[2] The items are: (1) education, (2) agriculture, (3) agrarian reform, (4) health, (5) highway, (6) labor, (7) welfare, (8) debt service, (9) veterans, (10) general economic development, (11) general social development, and (12) general services and administration.

3. A Measure of Health Expenditure Incidence

This study adopts procedures which have been tried and tested in two World Bank-sponsored studies: Meerman (1979) in Malaysia and Selowsky (1979) in Colombia.

Following Meerman, one can make the assumption that total utility to the beneficiary of the public provision of a health service is positively associated with the quantity of the good provided. Now, since average costs per unit of output are usually stable, it follows that utility and total costs are positively associated (Meerman, 1979:60). One can identify beneficiaries by the amount spent on their behalf. One no longer has to attempt the impossible, namely to measure the value of all benefits to recipients, but one only has to measure the distribution of the costs to the community of providing those benefits.

The basic measure is therefore:

$$(1^*) \quad S_i^j = (\overline{C_i} - \overline{P_i}) \, x \, Q_i^j$$

i = 1, 2, ... ,m public health services
j = 1, 2, . . . ,n income groups

where :

S_i^j : total subsidy received by a family in income group j as a result of consuming public health service i

$\overline{C_i}$: unit cost of public health service i

$\overline{P_i}$: unit private payment for public health service i

Q_i^j : number of times a family in income group j used the public health service i.

This measure is estimated for each income group in order to arrive at the distribution of total subsidy across income groups. The procedure essentially deals with the average number of times families (belonging to an income group) make use of a public health service and the per unit subsidy received as a result of consuming this service. Subsidies here include costs incurred by the government less payments made by the family to the public health facility. For a particular health service, one and the same unit subsidy is multiplied to *different* figures (because there are *various* income groups) of frequency of utilization of this service.

Of all the data sets required by the preceding equation, only unit cost $\bar{C}_i$ could be obtained from annual publications of government data; the rest had to be culled from raw survey data. A less straightforward way of obtaining $\bar{C}_i$, if one is not satisfied with the government's estimation of this unit cost, is as follows:

$$2^*) \quad \bar{C}_i = \frac{TC_i}{\bar{Q}_i \ x \ \Sigma k}$$

where :

TC_i : total cost of (as represented by total government expenditure on) public health service i

$\bar{Q}_i$: mean number of visits (of families in all income groups) to public health facility i, per family

Σk : total number of families in the area under study.

Information on mean use $\bar{Q}_i$ had to be obtained from survey data. On the other hand, figures for TC_i can be obtained from the Ministry of Health and Σk can be found in published statistics.

Income groups in this study are in quintiles. Families were ranked in order of ascending annual family per capita income. The first 20 per cent of the population with the lowest family per capita income became the first quintile; the next 20 per cent of the population with the second lowest family per capita income became the second quintile; and so on until the fifth quintile represents the top 20 per cent of the population on the income scale. It needs pointing out that most studies use family income in ranking families in the income scale. An innovation in this study, at least in work on public expenditure incidence, is the use of family per capita income, which for each family is total income divided by the number of members in the family. By using this measure, one avoids the error that results from using family income alone, namely, the implication that the welfare of a family is independent of the number of its members, that, for example, a three-person family is economically no better off than a large family with the same income.

4. The Distribution of Health Subsidies

In this section, the present study attempts to derive empirical results using the proposed methodology for determining the distri-

bution of public health subsidies across income groups. The basic data are culled from the 1978 Bicol Multipurpose Survey. The main objectives are: (1) to identify the beneficiaries of public health facilities, and (2) to measure the benefits received.

The two objectives are related to (1) the frequency of visits of families to health facilities and (2) the unit subsidy — subsidy per visit — received by families as a result of utilizing the facilities. The unit subsidy is defined as unit cost to the government in providing for the use of the facility less unit payment made by the family to the facility. The section begins discussion with costs incurred by the government.

4.1 Estimating Unit Costs of Public Facilities in Bicol

The procedure in estimating unit cost was conceptually simple: aggregate costs for a certain type of facility were first derived, then divided by the total number of visits (as derived from the survey frequencies) with the unit cost as the result.

Unit cost is given by equation (2*), as rewritten below:

$$(2') \qquad \overline{C}_i = \frac{TC_i}{\overline{Q}_i \times \Sigma k}$$

where :

TC_i : total government expenditure on public health facility i

$\overline{Q}_i$: mean number of visits (of families in all quintiles) to public health facility i, per family

Σk : total number of families in Bicol.

With respect to $\overline{Q}_i$, the survey obtained information on the frequency of visits per family for one month rather than the annual frequency. Hence, with respect to TC_i, it is desirable to use the expenditure data corresponding to the reference month of the survey. However, due to lack of monthly data, annual expenditures were divided by twelve to estimate monthly expenditures, as shown in column 1 of Table 1.

The survey gave as a mean 1.06 visits to public hospitals a month per family. If the total number of families in Bicol, as estimated by NCSO, was 550,000, the unit cost per visit can be calculated as follows:

Table 1 – Total Costs, Mean Unit Costs and Frequencies of Use of Public Health Facilities

;ility	Monthly Aggregate Expenditure of the Government, ₱000 (1)	Monthly Frequency of Visits per family (2)	Unit Cost, ₱ (3)
blic Hospital	1843.0	1.06	3.16
IU/CHO	710.0	1.46	0.88
ericulture Center	1.2	1.80	0.0012

ote: Not one of the survey respondents covered by the study (after excluding those with inconsistent or missing answers, or with encoding errors) made use of the nutrition center.

$$\frac{₱1,843,000}{(1.06)\,(550,000)} = ₱3.16$$

A similar procedure is followed for RHU/CHO visits, where the mean monthly total is 1.46 per family. Unit cost per visit is:

$$\frac{₱710,000}{(1.46)\,(550,000)} = ₱0.88$$

In the case of a puericulture center, unit cost is:

$$\frac{₱1,200}{(1.80)\,(550,000)} = ₱0.0012$$

In this study, as in past expenditure incidence studies on the Philippines, all types of government expenditures are treated as current. Capital outlays are not distinguished from current outlays. Current outlays, i.e., consumption expenditures, are allocated during the time period (1978) in which they are made. Capital outlays, i.e., investment expenditures, are likewise allocated in the year (1978) in which they are made, even when they really yield benefits in the future, hence, tending to overestimate that year's (1978) benefits. Nevertheless, the overestimation is offset to the extent that benefits from past (pre-1978) investment expenditures are approximated by allocating that year's (1978) investment expenditures,

4.2 Unit Private Payment

The procedure for estimating unit private payment made by the family to a public health facility is the same as that for computing unit cost. The values for total private payment are listed in column 1 of Table 2. Dividing this column by column 2 of the same table results in unit private payment (see column 3 of Table 2). Note that values for unit private payment are quite low. Families, on the average, paid less than ten centavos per visit to any of the public health facilities in Bicol in 1978.

Private payment should not be confused with the price of a visit to health facilities. While the latter involves all out-of-pocket costs (doctor, drugs, transportation, treatment and care) that the family incurred in connection with that visit, the former refers only to payments actually received by the facility from families.

The concept of unit subsidy is akin to $(\overline{C}_i - \overline{P}_i)$ of equation (1*) which is rewritten below:

(1') $$S_i^j = (\overline{C_i} - \overline{P_i}) \times Q_i^j \qquad \begin{matrix} i = 1, 2, 3 \\ j = 1, 2, 3, \ldots, 5 \end{matrix}$$

S_i^j : total subsidy received by a family in quintile j as a result of utilizing public health facility i

$\overline{C_i}$: unit cost — cost per visit — of public health facility i to the government

$\overline{P_i}$: unit private payment — private payment per visit — going to public health facility i

Q_i^j : number of times a family in quintile j used the public health facility i

Unit subsidy is thus obtained by subtracting unit private payment from unit costs, i.e., the last column in Table 2 is column 3 of Table 1 less column 3 of Table 2.

In treating government expenditures as current, the problem of underestimating unit subsidy arises when there is no capital outlay in the particular year of study — as related by the negative subsidy with respect to puericulture center (see column 4 of Table 2). A quick inspection of government expenditure data reveals that capital outlay was zero for puericulture centers in 1978. (Further investigation with the Accounting Division of the Ministry of Health disclosed that no capital outlay was incurred by the puericulture center even three years prior to 1978. Information on much

Table 2 — Private Payment, Aggregate Frequency and Unit Subsidy for Public Health Facilities

Facility	Monthly Total Private Payment Going to Government, ₱000 (1)	Monthly Aggregate Frequency of Visits, 000 (2)	Unit Private Payment Going to Government, ₱ (3)	Unit Subsidy, ₱ (4)
Public Hospital	47.17	583	0.08	3.08
RHU/CHO	27.96	803	0.03	0.85
Puericulture Center	3.50	990	0.0035	—0.0023

earlier years is lacking.) One just has to bear in mind that puericulture subsidy was most likely positive to the extent that investment (e.g., infrastructure) made in the past were still yielding benefits in 1978.

4.3 Distributive Accounting

In Table 3, the utilization of three public health facilities is distributed by the reference variables. Column 1 gives the mean monthly frequency of use per family. Mean payment made by the family — that is, the family contribution toward public costs — is displayed in column 2 as the product of frequency and unit private payment. Total subsidy can be computed as the product of frequency and unit subsidy.

Table 3 — Distribution of Health Subsidy Per Family in One Month by Quintile and Location

Partition	Average Frequency of Visits (1)	Mean Payment Made by Family to Government, ₱ (2)	Total Subsidy ₱ (3)	Per Capita Subsidy ₱ (4)
A. Public Hospital				
Quintile				
1	1.08	0.09	3.33	0.37
2	1.09	0.09	3.36	0.39
3	1.00	0.08	3.08	0.36
4	1.08	0.09	3.33	0.44
5	1.00	0.08	3.08	0.51
Location				
Urban	1.11	0.09	3.42	0.42
Rural	1.05	0.08	3.23	0.40
Bicol Average	1.06	0.08	3.26	0.41
B. RHU/CHO				
Quintile				
1	2.00	0.06	1.70	0.19
2	1.30	0.04	1.10	0.13
3	1.29	0.04	1.10	0.13
4	1.20	0.04	1.02	0.13
5	1.44	0.04	1.22	0.20

ble 3 (Continued)

Partition	Average Frequency of Visits (1)	Mean Payment Made by Family to Government, ₱ (2)	Total Subsidy ₱ (3)	Per Capita Subsidy ₱ (4)
Location				
Urban	1.43	0.04	1.22	0.15
Rural	1.47	0.04	1.25	0.16
Bicol Average	1.46	0.04	1.24	0.15
Puericulture Center				
Quintile				
1	2.50	0.009	−0.006	−0.0007
2	2.00	0.007	−0.005	−0.0006
3	1.67	0.006	−0.004	−0.0005
4	1.00	0.004	−0.002	−0.0003
5	0.00	0.000	0.000	0.0000
Location				
Urban	0.00	0.000	0.000	0.0000
Rural	1.80	0.006	−0.004	−0.0005
Bicol Average	1.80	0.006	−0.004	−0.0005

Turning to private payments, with respect to public hospitals, one can see no systematic relationship between income and private payments. With respect to RHU/CHO, the bottom quintile was made to pay the most compared to the rest that paid the same amount; however, a quick inspection of frequency indicates that this quintile visited public hospitals most frequently, thus leading to the result that they had to pay the most. With respect to puericulture center, there was a negative relationship between income and amount paid per visit. Again, the reason is that there was a negative relationship between income and the frequency of utilization. Note that the distribution of frequency is the main determinant of the distributions of mean private payment (column 2), as well as total subsidy (column 3). The reason is that the frequencies across quintiles are multiplied by the per visit values — in Table 2 — of mean private payment and subsidy.

Private payments to public hospital and RHU/CHO are very small in comparison to the cost of operating these health facilities; in that sense, the subsidy is quite large. However, in relation to the total medical expenditures of the household, which include payments for medicines purchased from private drugstores and other fees, the subsidy of the government is very small. On the other hand, with respect to puericulture center, unit private payment — although quite small — exceeded the already underestimated unit payment by the government, leading to subsidies of negative value (column 3 of Table 3).

Paying attention to the column of average frequencies would be more fruitful since the distribution of health benefits depends on the distribution of frequency of visits. However, the data had to be converted first to a per capita basis to correct for the substantial reduction in size of family as income increases. Reducing the data on public hospital visits to a per capita basis gives the following:

Quintile	Per capita frequency	
1	0.11	
2	0.12	
3	0.11	mean: 0.13
4	0.14	
5	0.17	

The relationship of per capita frequency with income is as follows: Quintiles 1, 2, and 3 were below average while the top two were above average. In terms of location, rural families made the same number of visits per capita, on the average, as families in the whole region. Members of urban families visited public hospitals slightly more frequently (8%) than members of families in rural areas or the entire region.

Location	Per capita frequency	
Urban	1.14	mean: 0.13
Rural	1.13	

Reducing the data on RHU/CHO visits to per capita basis gives

ıe following:

Quintile	Per capita frequency	
1	0.22	
2	0.15	
3	0.15	mean: 0.18
4	0.16	
5	0.24	

uintiles at the top and bottom of the income scale had above-verage utilization. In terms of location, the relative positions of rban and rural families were the reverse of their relative positions ith respect to public hospital visits. While mean use of public hos-itals by urban families exceeded that of the rural families, the ıral families, not unexpectedly, relied more (6% more frequently) n the rural health system than did urban families.

Location	Per capita frequency	
Urban	0.17	mean: 0.18
Rural	0.18	

From the data on puericulture center (Table 3), it can be een that visits are clearly and negatively associated with income. 'he association is so strong that even on a per capita basis, the onclusion holds:

Quintile	Per capita frequency	
1	0.28	
2	0.23	
3	0.20	mean: 0.22
4	0.13	
5	0.00	

The relationship can be expressed in terms of percentage deviation rom mean per capita frequency as follows:

Quintile	Percentage deviation
1	27
2	5
3	−9
4	−41
5	−100

Frequency of visits to puericulture center invariably decreased as income increased. The economically better-off consumed substantially less — none by the richest — than the lower-income groups.

In terms of location, rural families consumed the mean amount per capita.

Location	Per capita frequency
Urban	0.00
Rural	0.22

5. The Model

The preceding section has investigated how the utilization of facilities is distributed across income groups. What determines this utilization is the concern of the next portions of this study.

The decision of whether or not to use a particular health facility is specified to depend on the money and time price associated with that facility, money and time price of alternative facilities, family income (proxied by total expenditures), and a set of social, demographic and biological variables. Health status, in turn, depends on family income, visits to health facilities, personal hygienic practices (such as treating water before drinking), clean environment (proper sewerage); health knowledge and beliefs, mother's education, expenditures on food; type and perceived gravity of illness and a set of demographic variables. Particularly, the model is specified as follows:

(1) USERHU = f (RHUFEE, PCFEE, PUBHFEE, PRIVHFEE, PRIVCFEE, HILOTFEE, RHUTIME, PCTIME, PUBHTIME, PRIVHTIME, PRIVCTIME, HILOTIME, FREQILL, TOTEXP, AGE 0, AGE 1-6, AGE 65 UP, FEM, EDM, PERSONS, LOCATION, HEALKNO, PSERIOUS, DOC/POP, HILOT/POP, RHUDIST, MOMHOME, INSUR)

(2) USEPC = f (PCFEE, RHUFEE, PUBHFEE, PRIVHFEE, PRIVCFEE, HILOTFEE, PCTIME, RHUTIME, PUBHTIME, PRIVHTIME, PRIVCTIME, HILOTIME, FREQILL, TOTEXP, AGE 0, AGE 1-6, AGE 65 UP, FEM, EDM, PERSONS, LOCATION, HEALKNO, PSERIOUS, DOC/POP, HILOT/POP, PCDIST, MOMHOME, INSUR)

) USEPUBH= f (PUBHFEE, RHUFEE, PCFEE, PRIVHFEE, PRIVCFEE, HILOTFEE, PUBHTIME, RHUTIME, PCTIME, PRIVHTIME, PRIVCTIME, HILOTIME, FREQILL, TOTEXP, AGE 0, AGE 1-6, AGE 65 UP, FEM, EDM, PERSONS, LOCATION, HEALKNO, PSERIOUS, DOC/POP, HILOTPOP, PUBHDIST, MOMHOME, INSUR)

4) USEPRIVH = f (PRIVHFEE, RHUFEE, PCFEE, PUBHFEE, PRIVCFEE, HILOTFEE, PRIVHTIME, RHUTIME, PCTIME, PUBHTIME, PRIVCTIME, HILOTIME, FREQILL, TOTEXP, AGE 0, AGE 1-6, AGE 65 UP, FEM, EDM, PERSONS, LOCATION, HEALKNO, PSERIOUS, DOC/POP, HILOT/POP, PRIVHDIST, MOMHOME, INSUR)

5) USEPRIVC = f (PRIVCFEE, RHUFEE, PCFEE, PUBHFEE, PRIVHFEE, HILOTFEE, PRIVCTIME, RHUTIME, PCTIME, PUBHTIME, PRIVHTIME, HILOTIME, FREQILL, TOTEXP, AGE 0, AGE 1-6, AGE 65 UP, FEM, EDM, PERSONS, LOCATION, HEALKNO, PSERIOUS, DOC/POP, HILOT/POP, PRIVCDIST, MOMHOME, INSUR)

6) USEHILOT = f (HILOTFEE, RHUFEE, PCFEE, PUBHFEE, PRIVHFEE, PRIVCFEE, HILOTIME, RHUTIME, PCTIME, PUBHTIME, PRIVHTIME, PRIVCTIME, FREQILL, TOTEXP, AGE 0, AGE 1-6, AGE 65 UP, FEM, EDM, PERSONS, LOCATION, HEALKNO, PSERIOUS, DOC/POP, HILOT/POP, HILOTDIST, MOMHOME, INSUR)

7) FREQILL = f (TOTEXP, VISRHU, VISPC, VISPUBH, VISPRIVH, VISPRIVC, VISHILOT, $TREATH_2O$, HYGSEW, HEALKNO, EDM, AGE 0, AGE 1-6, AGE 65 UP, FEM, PSERIOUS, LOCATION, PERSONS, FOOD, ACUTNUM)

A list of the foregoing variables is presented in Table 4. Symbols and measures of the variables are given. Naturally, the measures

Table 4 — Description of Variables

Variable Description	Measure	Symbol
Use of health facilities	— Whether or not household visited:	
	an RHU/a CHO	USERHU
	a puericulture center	USEPC
	a public hospital	USEPUBH
	a private hospital	USEPRIVH
	a private clinic	USEPRIVC
	an herbolario/hilot's house	USEHILOT
	— Number of visits to:	
	an RHU/a CHO	VISRHU
	a puericulture center	VISPC
	a public hospital	VISPUBH
	a private hospital	VISPRIVH
	a private clinic	VISPRIVC
	an herbolario/hilot's house	VISHILOT
Income	— Total Expenditures per month as proxy	TOTEXP
Money price	— Average outlay incurred by the family in making a visit to:	
	RHU/CHO	RHUFEE
	puericulture center	PCFEE
	public hospital	PUBHFEE
	private hospital	PRIVHFEE
	private clinic	PRIVCFEE
	herbolario/hilot's house	HILOTFEE
Time price	— Time (minutes) spent in waiting in:	
	RHU/CHO	RHUTIME
	puericulture center	PCTIME
	public hospital	PUBHTIME
	private hospital	PRIVHTIME
	private clinic	PRIVCTIME
	herbolario/hilot's house	HILOTIME
Age composition	— 1 — presence of children under one year of age	AGE 0
	0 — otherwise	
	— Number of children in 1-6 age bracket	AGE 1-6
	— 1 — presence of elderly 65 and over	AGE 65 UP
	0 — otherwise	

ıble 4 (Continued)

Variable Description	Measure	Symbol
ex composition	— Per cent female	FEM
amily size	— Number of living person in the family	PERSONS
ducation	— Years of schooling of mother	EDM
ealth status	— Frequency of illness	FREQILL
ealth knowledge and beliefs	— Index of health knowledge and beliefs ranging from most traditional to most modern	HEALKNO
erceived gravity of illness	— Number of cases perceived as serious or very serious	PSERIOUS
ype of illness	— Number of acute cases	ACUTNUM
ygienic sewerage	1 — flush system is used 0 — otherwise	HYGSEW
reated drinking water	1 — water is treated before drinking 0 — otherwise	$TREATH_20$
ood Expenditure	Monthly food expenditure	FOOD
vailability of health service	— Physician-to-population ratio	DOC/POP
	— Ratio of hilot to population	HILOT/POP
ealth insurance	0 — no insurance 1 — at least one family member is covered by health insurance	INSUR
istance of health facility	Distance (kilometers) of the following from the family's barangay:	
	RHU/CHO	RHUDIST
	puericulture center	PCDIST
	public hospital	PUBHDIST
	private hospital	PRIVHDIST
	private clinic	PRIVCDIST
	herbolario/hilot's house	HILOTDIST
ime allocation of mother	1 — mother stays at home, i.e., either does not work or works at home	MOMHOME
	0 — otherwise	
ocation of residence	0 — rural 1 — urban	LOCATION

were dictated by the available data. It bears noting that although the subject of interest is public facilities, the present study also looks into private and traditional sources of care because choice of facilities is made not in isolation from alternatives.

It needs noting, however, that the system of demand equations in the present study is not in the tradition of neoclassical demand theory wherein the dependent variables measure the nonnegative amounts of goods or services purchased. The dependent variables in the present study do not fit the neoclassical mold because the data tend to cluster around one and zero, that is, families tend to make one or no visit to health facilities. As a result, the dependent variables are basically qualitative in nature; they represent discrete choices. Since families have a number of health facilities to choose from, one may expect the present study to use a multiple-choice model where all choices are assumed to be mutually exclusive. However, families in the survey did not make mutually exclusive choices in their use of health facility during the one-month period preceding the interview. For example, the use of a private clinic does not preclude a family from having used a public hospital. Hence, the present study had to employ a binary-choice model to each of the demand functions (equations (1) to (6)). In particular, using a maximum-likelihood estimation procedure, a binary-choice logit model of the following form was used to estimate the demand equations:

$$\log_e \left[\frac{P(Y=1)}{1-P(Y=1)} \right] = \beta X + \in$$

where:

$P(Y=1)$:	the probability that the Yth event (utilization of a particular health facility) has occurred
X:	vector of independent variables
β:	vector of regression parameters
$\in$:	uncorrelated disturbance terms

Under the present procedure, all parameter estimators are consistent and also asymptotically efficient. In order to test the significance of a coefficient, a statistic using the chi-square distribution is calculated by computing the estimated coefficient divided by its standard error and squaring the result.

What follows is a brief discussion on why some of the variables this study are measured as they appear in Table 4.

Note that the income variable is proxied by total expenditures. ıcome was initially measured by wage rate and non-wage income ıt these variables are not significant in any of the demand equaons. In addition, understated income data -- a perennial problem surveys — make coefficients of income variables unreliable. Hence,)tal expenditures was chosen as substitute.

With respect to price, the closest survey information to be)und is the amount spent by the family for the sick member's 'eatment and care. This amount includes costs for doctor, visits, rugs, as well as payment in cash and in kind. A problem regarding ıe treatment of non-using families was encountered. The usual)lution is to impute prices using the urban or rural average price, epending upon the location of the family. Another is to use the arangay average price. The second method allows more variation ı the price variable. Lastly, another method would be to eliminate ıe price variable from the model and represent it by demographic ıctors (e.g., family size) and facility variables (e.g., distance of ealth service from barangay) at both household and barangay 'vels. The rationale for the last method is that a single cross-sec-ion of household observations is unlikely to contain a direct price ariation of substantial degree, while geographical variation in gov-rnment interventions in health facilities, since they affect prices ı predictable ways, can be exploited to test the model (Rosenz-veig and Wolpin, 1982).

All three methods were employed in the present study. The irst and second methods fared better in that smaller mean square 'rrors were generated. The second method is preferred due to its llowance for greater price variation. The same procedures were ıpplied to the time variable and the same findings held.

Note that instead of income per capita, the model has income and family size as explanatory variables. Specifying income per capita in a model which already includes the family size variable resulted in multi-collinearity. The choice was between (1) considering income per capita only or (2) including both income and family size. Both were tried and the second alternative produced a better fit.

It needs mentioning that Akin *et al.* (1985) did a study similar to the present one using the same data. However, their basic unit

of analysis was the individual, not the family. Since they were dealing with data at the individual level, the outcomes were mutually exclusive, e.g., the use of a traditional facility precludes an individual from having used a public or private facility. They were thus able to use the multiple logit model but the actual comparisons among choices were still binary.

6. Econometric Analysis of Health Facility Use

The econometric results based on the logit model discussed in the preceding section are not shown here.[3] The logit exercise enabled this study to trim down the variables to the essentials. But this is not to say that only logit was used to compute coefficient estimates.

Two-stage least squares (2SLS) was also used on many versions of a thirteen-equation model where money price and health status were endogenous, and income variable was in the form of wage rate and non-wage income. The money price equations did not come out with meaningful results, and neither did the income variable emerge significant in the demand equations. The 2SLS was also used on many versions of a seven-equation model where money price was exogenous and health status was endogenous. Likewise, it was used on another seven-equation model where money and time prices were eliminated but health status remained endogenous. The results did not improve.[4]

As mentioned in the preceding section, total expenditures was chosen as proxy for the income variable. The study tried both (1) total expenditures including medical expenditures and (2) total expenditures excluding medical expenditures. There was no significant difference in the results derived from these two measures, whether employing 2SLS, ordinary least squares (OLS), or logit. (The results shown for TOTEXP refer to total expenditures including medical expenditures.)[5]

---

[3] They appear in the appendices of the author's dissertation.

[4] See appendices of the author's dissertation.

[5] Ownership of land was also applied as a proxy for income. However, not only was this proxy variable insignificant, but its partial correlation coefficient was also smaller than those of the total-expenditure alternatives. Moreover, the application of this proxy produced a smaller adjusted coefficient of multiple determination ($\bar{R}^2$) than the alternatives.

The logit exercise brought to light a number of items to study ther. One is the price (money and time) variable. The problem missing observations for non-users propelled the present study to lace the missing observations with the urban or rural sample an (of the available observations), depending upon the location the family. This sample mean method is just one of various utions tapped by the present study (see preceding section). The nple mean method, however, implies mixing data, i.e., mixing e data originally intended for use with estimates, e.g., urban sample an, rural sample mean. Opinions that such mixing may have partly used the price variables to exert an unexpectedly positive influce on demand encouraged the present study to use, for all obvations, barangay average prices instead.

A second item that surfaced is the necessity of cleaning up e multicollinearity that exists between health status (i.e., frequen- of illness) and certain variables in the demand equations. (These riables appear as explanatory variables of health status in the venth equation.) A common solution to the problem of multillinearity is to drop variables. In this case, the solution was to drop ther the health status variable or the variables correlated with it.

A third point that emerged concerns the frequency of illness quation. This equation may actually be eliminated because the esent data set, due to the nature of the survey, involves the sick nly. Although a sample of sick people is appropriate for demand nalysis, this is not so for the health status equation. Both sick and on-sick should be included in studying the production of health. ccording to Akin *et al.* (1985), narrowing the issue to sick people llows for competent handling of demand, but it leaves the producon of health as a separate problem requiring an entirely different ocus. The present study further supports the literature reviewed y Akin and colleagues in demonstrating how mixing the two conepts, viz., demand for health services and production of health, as not only complicated, but has often confused the analysis. t is thus decided to exclude the health status equation and to focus nstead on demand for health services.

A final matter that the logit exercise helped ascertain is the nsignificance of variables such as FEM, LOCATION and MOMHOME. These variables are insignificant, whether one uses ogit, 2SLS or OLS. The unimportance of FEM indicates that females are not treated differently from males. The signs of MOMHOME coefficients are correct (positive for public and traditional facilities, negative for private facilities), but the coefficients are statistical-

ly insignificant. Urban residence (LOCATION), on the other hand, has no power in explaining visit choices. Hence, these variables can be excluded altogether in future estimations (of demand for health facilities) using the same data.

All these items that arose from the logit exercise are reconsidered in the present study. In particular, reestimation was done using OLS. The OLS reestimation is different from the logit exercise in those areas pointed out in preceding discussions. Firstly, the OLS reconsideration refrains from mixing observations by employing barangay average prices for all observations. Secondly, in solving the multicollinearity problem, the choice was between dropping frequency of illness or dropping the variables correlated with it. Both were tried and the latter yielded smaller standard errors of the remaining regression coefficients. The variables dropped are: AGE 0, AGE 1-6, AGE 65 UP, EDM, PSERIOUS and HEALKNO.[6] Only TOTEXP and PERSONS were retained because of specification reasons. One's judgment should be applied in deciding whether or not to drop an explanatory variable because the gain in the reduction in standard errors of remaining variables, when the variable is dropped, must be traded off against the possible introduction of bias due to misspecification of the equation.

The third consideration was to eliminate the production of health equation in order to avoid confusion in studying a limited sample of sick people only. The last consideration was to exclude the explanatory variables which were insignificant no matter which estimation procedure or what specification was used. To reiterate, these variables were FEM, LOCATION and MOMHOME.

These four points were taken into account in the reestimation using OLS as presented in Tables 5 to 7. The values shown are elasticities, not coefficient estimates. Table 5 provides the values for RHU/CHO and puericulture center, Table 6 presents results for public and private hospitals, and Table 7 shows elasticities for private clinic and hilot/herbolario.

The adjusted coefficients of multiple determination ($\bar{R}^2$'s), although low for researchers comfortable with time-series studies, are actually quite high compared to values found in cross-section

[6] The variables FEM, LOCATION and MOMHOME were also dropped, but mainly because of insignificance rather than multicollinearity.

Table 5 – OLS Results for RHU/CHO and Puericulture Center

ıation Number	1		2	
›endent Variable	VISRHU		VISPC	
›lanatory Variable	Elasticity	t	Elasticity	t
RHUFEE	−0.0476	−0.192	0.3868	0.775
PCFEE	−0.2777	−0.555	−0.6902	−0.686
PUBHFEE	−0.1206	−0.449	−0.8463	−1.564
PRIVHFEE	−0.9894[b]	−2.289	0.1810	0.208
PRIVCFEE	−0.1506	−0.416	0.6581	0.903
HILOTFEE	0.2293	0.929	0.0801	0.161
RHUTIME	1.6246[c]	4.432	−0.9301	−1.261
PCTIME	−0.3813	−0.557	1.7245	1.251
PUBHTIME	−0.2620	−0.864	1.0690[a]	1.752
PRIVHTIME	0.1915	0.346	−1.6617	−1.492
PRIVCTIME	−0.6146[a]	−1.689	−0.4318	−0.590
HILOTIME	−0.2347	−0.801	−0.7123	−1.208
FREQILL	0.4889	1.612	1.6334[c]	2.675
TOTEXP	−0.4003	−1.018	−0.6410	−0.810
PERSONS	0.6195	1.043	−0.2406	−0.201
DOC/POP	0.1693	1.407	0.0871	0.360
HILOT/POP	−0.2079	−0.711	−0.1659	−0.282
INSUR	−0.0083	−0.070	−0.0128	−0.053
RHUDIST	−0.1348	−0.680	0.1189	0.298
PCDIST	0.1718	0.603	0.0568	0.099
PUBHDIST	−0.2936	−0.823	−0.1010	−0.141
PRIVHDIST	0.9786[b][a]	2.343	−0.3744	−0.445
PRIVCDIST	−0.7668	−1.696	−0.1796	−0.197
HILOTDIST	−0.2351[a]	−1.864	−0.2281	−0.898
tercept[d]	0.153		0.082	
²	0.099		0.017	
	2.739		1.273	

[a]Significant at .10 level.

[b]Significant at .05 level.

[c]Significant at .01 level.

[d]Not elasticity but coefficient or parameter estimate.

Table 6 — OLS Results for Public and Private Hospitals

Equation Number		3		4
Dependent Variable		VISPUBH		VISPRIVH
Explanatory Variable	Elasticity	t	Elasticity	t
RHUFEE	0.3261[a]	1.712	−0.5498[a]	−1.871
PCFEE	0.2438	0.635	1.3582[b]	2.294
PUBHFEE	0.6545[c]	3.172	−0.8127[b]	−2.553
PRIVHFEE	−0.9275[c]	−2.796	−0.8282	−1.618
PRIVCFEE	−0.4811[a]	−1.730	0.3084	0.719
HILOTFEE	−0.0676	−0.356	−0.7711[c]	−2.638
RHUTIME	−0.6235[b]	−2.216	−0.1442	−0.332
PCTIME	−0.6946	−1.322	−2.4858[c]	−3.066
PUBHTIME	0.9977[c]	4.287	−0.4044	−1.127
PRIVHTIME	−0.0685	−0.161	2.8558[c]	4.360
PRIVCTIME	−0.5827[b]	−2.087	−0.2005	−0.465
HILOTIME	−0.0777	−0.346	0.5046	1.454
FREQILL	−0.4202[a]	−1.805	−0.0531	−0.148
TOTEXP	−0.2205	−0.731	0.2959	0.636
PERSONS	0.3302	0.725	0.5468	0.778
DOC/POP	−0.0383	−0.414	0.0391	0.275
HILOT/POP	0.4089[a]	1.821	0.4563	1.318
INSUR	−0.0083	−0.091	0.1190	0.841
RHUDIST	−0.2909[a]	−1.912	−0.3911[a]	−1.666
PCDIST	−0.0045	−0.021	0.7280[b]	2.157
PUBHDIST	−0.3731	−1.362	−0.2015	−0.477
PRIVHDIST	0.5844[a]	1.823	0.4171	0.843
PRIVCDIST	−0.1048	−0.302	−0.2199	−0.411
HILOTDIST	0.1213	1.252	0.0575	0.385
intercept[d]	0.183		0.176	
$\bar{R}^2$	0.157		0.120	
F	3.930		3.156	

[a]Significant at .10 level.

[b]Significant at .05 level.

[c]Significant at .01 level.

[d]Not elasticity but coefficient or parameter estimate.

Table 7 — OLS Results for Private Clinic and Hilot Herbolario

ation Number	5		6	
endent Variable	VISPRIVC		VISHILOT	
lanatory Variable	Elasticity	t	Elasticity	t
HUFEE	0.0868	−0.974	0.2448	1.046
CFEE	0.3167[a]	1.763	1.2925[c]	2.740
UBHFEE	−0.1103	−1.142	0.1000	0.433
RIVHFEE	−0.4183[c]	−2.694	−0.4971	−1.219
RIVCFEE	−0.4811[a]	−1.730	0.3084	0.719
RIVCFEE	0.1473	1.131	−0.5900[a]	−1.726
HILOTFEE	−0.1012	−1.140	0.7128[c]	3.060
HUTIME	−0.1416	−1.075	−0.5150	−1.489
CTIME	−0.5929[b]	−2.410	−1.6863[c]	−2.611
UBHTIME	−0.1319	−1.211	0.0011	0.004
RIVHTIME	−0.1331	−0.670	−0.3277	−0.628
RIVCTIME	0.3437[c]	2.629	−0.7212[b]	−2.101
HILOTIME	−0.800	−0.760	0.5672[b]	2.052
FREQILL	0.4807[c]	4.411	−0.2091	−0.731
TOTEXP	0.3028[b]	2.144	−0.6525[a]	−1.760
ERSONS	−0.5329[b]	−2.498	0.4620	0.825
OOC/POP	−0.0005	−0.012	−0.0769	−0.678
HILOT/POP	−0.1093	−1.040	0.5466[b]	1.981
NSUR	−0.0088	−0.204	0.0151	0.134
RHUDIST	0.1192[a]	1.674	0.0682	0.365
PCDIST	−0.0182	−0.178	−0.2594	−0.964
PUBHDIST	0.0492	0.384	−0.0686	−0.204
PRIVHDIST	−0.2358	−1.571	−0.1045	−0.265
PRIVCDIST	0.0921	0.567	0.1727	0.405
HILOTDIST	−0.0089	−0.196	0.0505	0.424
ercept[d]	0.569		0.137	
	0.311		0.131	
	8.098		3.369	

[a]Significant at .10 level.

[b]Significant at .05 level.

[c]Significant at .01 level.

[d]Not elasticity but coefficient or parameter estimate.

studies in the literature. The OLS results presented in the text are basically similar to the logit results. For example, in both procedures, income is found to exert a positive influence on use of private clinic. However, the OLS reestimation yielded a greater number of significant economic factors. In particular, more cross prices (both money and time) are significant. This indicates the interdependence of health facilities, which are organized into a referral system but which at the same time, is a competitive network.

6.1 Income Effects

The higher the family income, the greater the demand for private clinic. The income elasticity of demand is 0.30 for private clinic. Demand for *hilot* is even more responsive to changes in income. However, the sign of the elasticity is negative (−0.65), which indicates that the lower the family income, the greater the utilization of *hilot/herbolario*

Although insignificant, the signs of the income coefficients for public facilities are all negative, implying both the pro-poor — quite consistent with first part findings on beneficiaries of subsidies — and at the same time the inferior nature of public facilities. On the other hand, the signs for the remaining modern private facilities are all positive. Akin *et al.* (1985) found that the level of assets was a significant predictor of choosing a private practitioner over other practitioners but the magnitude of the effect was almost imperceptible.

One would expect income to be significant in more equations had the survey captured all income classes. However, the survey did not cover the rich.[7] Results in this study pertain to the poor and the very poor. For these people, going to a health facility was a matter of need rather than choice. However, in reality, there could very well be an income threshold above which income becomes a significant determinant of demand for health facilities, but below which morbidity is the important factor.

6.2 Money-Price Effects

The own-money price of a visit did not explain demand for health facility except for public hospital and *hilot/herbolario.*

[7] In its attempt to understand the causes of poverty, the survey concentrated on low-income areas. In fact, the richest among the respondents were still poor by NCSO standards.

respect to these exceptions, the signs of the own-money price cients are positive and the statistically significant elasticities rge (0.65 and 0.71) compared to those found in the literature / to /0.20/).

The unexpected positive sign may be due to the procedure scussed in the section on the model of using expenses as facility). Note that although barangay average prices are employed, alues are still based on expenses. Expenses incurred may be because patients with the greatest need visit them. Mildly tients do not face the same high costs. When expenditures mployed to explain visit choices, people using facilities are l in the literature to do so for the misleading reason that price, ired by expenses, is so high, instead of the real reason that greatly need the treatment.[8] This is the case even with the use rangay average prices.

Nevertheless, in their choice among health alternatives, families learly responsive to the relative money prices of facilities. For ple, higher expenditures at puericulture centers deflected de- l toward *hilot/herbolarios*. Other facilities which have subs- relationships are: private hospital and puericulture center, public hospital and RHU/CHO. Most of the facilities are com- ents, namely: RHU/CHO and private hospital, public hospital private hospital, public hospital and private clinic, private ital and *hilot/herbolario*, private clinic and private hospital, *ilot/herbolario* and private clinic.

Time-Price Effects

As with the money price variable, the own-time (i.e., waiting) effects are positive and large. In the literature, waiting-time elasticity is approximately -0.05 for private care and -0.12 ublic care. In this study, all facilities except puericulture center very responsive to waiting-time price, with elasticities ranging 0.34 to 2.86.

The positive sign may be explained by any combination of factors. One is that patients view waiting time as a chance

---

8 Another possible factor for the unexpected positive sign is cultural. aire, villagers were not receptive to services which did not cost money; ever, after fees were imposed, demand increased (Lashman, 1975).

to socialize, as in the case of Malaysia (Heller, 1976). Another is the physical setup of the health facility. The informal setup of chairs and benches in the *hilot/herbolario's* house and RHU/CHO allows people to move around, interact and socialize. Last is that patients may perceive a positive relationship between the quality of care received and the time spent in treatment (and hence, the time spent waiting for one's turn). The last factor is especially strong in private facilities.

As with money prices, most of the significant cross-time effects are negative. For example, an increase in the time required to wait in a private clinic deflects demand from RHU/CHO as well. More waiting time in RHU/CHO in turn deflects demand from public hospital. The results show that most of the facilities are actually complements.

6.4 Other Effects

A larger family tends to veer away from private clinics; otherwise family size is not a good predictor of demand for health facilities. Health status, on the other hand, is a significant predictor. A higher frequency of illness in the family leads to greater utilization of private clinic. A similar result was found for puericulture center. The opposite was found for public hospital.[9]

The higher the *hilot*-to-population ratio, the greater the utilization of *hilots*, and also, the greater the utilization of public hospitals. The latter may be due to the Hilot Training Program, which succeeded in assimilating indigenous health manpower into the formal health system, such that after *hilots* underwent training, many of them even accompanied their clients to government health facilities, such as public hospitals.

Insurance had no power in explaining visits to health facilities. Distance of facility, however, was significant. While the facility's

---

[9] Frequency of illness does not necessarily lead to high utilization of health facilities. For non-emergency situations, sick members could have resorted to self-treatment or directly consulted drugstores for prescriptions. However, these issues cannot be fully examined here since they were not covered in the survey.

Perceived seriousness of illness was also employed as an alternative measure of health status. However, the new regression yielded a larger mean square error.

distance was not a significant predictor of its utilization, the nce of alternative facilities proved to be an important deter- ınt of the utilization of that facility. Take for example a private c. While distance of private clinic is not a significant predictor rivate clinic visits, the distance of RHU/CHO proves to be an ɔrtant determinant. The more distant RHU/CHOs are from ntial users, the more likely they are to visit private clinics.

7. Concluding Remarks

This study has two parts. One described the distribution of th benefits across income groups; the other studied the use of th facilities. The two parts are seen to be actually related once first part is regarded as an investigation of how the utilization acilities, i.e., frequency of visits to facilities, is distributed across ɔme groups. The rationale for this view is that the distribution of efits from health facilities is ultimately determined by the distri- on of utilization or frequency of visits to the facilities. What ermines this frequency is the concern of the second part.

From the first part, one learns that income is not a barrier to ess to public health care. Public facilities, in general, did not riminate against the poor. Puericulture centers, in particular, e pro-poor in that frequency of visits or the utilization of these ters increased as income declined. Because the poor are more ensively covered in the survey, the results for the puericulture ter are further strengthened. In other words, between the poor l the very poor, puericulture center is pro-very-poor.

Utilization of health facilities is studied in the second part ıg a model of demand for health services where determinants lude income, insurance, money price, time price, health status, ilability and distance of health facility. A host of socio-demo- phic variables is excluded after an enormous amount of esti- tion (using OLS, 2SLS, logit) proved that it is best to do so due multicollinearity problems with health status.

From the second part, one learns that costs — whether money time — did not deter use of health facilities. Another finding is: e lower the income, the lower the utilization of modern private ilities. So, although public facilities are pro-poor — as first part dings indicate — private counterparts are pro-rich. The implication that although the public health delivery system in the country es to provide patient care within the reach of all citizens, the pri-

vate sector may not be doing the same. Policy directions must be geared towards what the government can do to achieve equity in the private sector. This is especially important because many poor people also use private clinics (most probably for quality reasons). If the government wants to help poor people, an additional place to reach them is at private clinics (Akin *et al.*, 1985).

Other conclusions emerge. Families are responsive to the relative money prices of facilities. While most of the facilities are complements, some are clearly substitutes, e.g., *hilot* and puericulture center, private hospital and puericulture center. Health planners would thus have to continue figuring out how public facilities can establish themselves effectively in a competitive environment. The Hilot Training Program has been particularly effective in this regard. Researchers found that after *hilots* underwent training as family planning motivators, some of them began to accompany their clients to government health facilities for prenatal examinations even though a traditional delivery was already planned. In fact, the program has paved the path towards the training of indigenous health workers and their assimilation into the formal health system (International Hospital Federation and Philippine Hospital Association, 1978).

REFERENCES

in, J.S., Griffin, C.C., Guilkey, D.K. and Popkin, B.M. (1985), *The Demand for Primary Health Services in the Third World*, Totowa, New Jersey: Rowman & Allanheld.

ing, P. (1984), "Measuring the Incidence of Health Expenditures Using Secondary Data," Philippine Institute for Development Studies.

ller, P.S. (1976), "A Model of the Demand for Medical and Health Services in West Malaysia," Discussion Paper No. 62, Center for Research on Economic Development, Ann Arbor: University of Michigan.

ernational Hospital Federation and Philippine Hospital Association (1978), *Proceedings of the Seventh Regional Conference of the International Hospital Federation and the 29th Annual National Convention of the Philippine Hospital Association*, Theme: "Health Care in Developing Countries," Manila, November 26-30, 1978.

/me, T.B. (1974), "Redistribution of Income Through National Government Expenditures," M.A. thesis, UP School of Economics.

shman, K. (1975), *Syncrisis: The Dynamics of Health. An Analytic Series on the Interactions of Health and Socioeconomic Development*, Vol. 14, *Zaire*. DHEW Publication No. (OS) 74-50, 019, Washington, D.C.: Office of International Health, Division of Planning and Evaluation, U.S. Department of Health, Education, and Welfare.

:erman, J. (1979), *Public Expenditures in Malaysia: Who Benefits and Why*, A World Bank Research Publication, New York, Oxford University Press.

ıtional Tax Research Center (1974), "A Study of the Incidence of Government Expenditures by Income Class, 1971," *Tax Monthly*, Vol. 15, No. 6.

)senzweig, M.R. and Wolpin, K.I. (1982), "Governmental Interventions and Household Behavior in a Developing Country: Anticipating the Unanticipated Consequences of Social Programs," *Journal of Development Economics*, Vol. 10.

ın, E.A. (1975), "Taxation, Government Spending and Income Distribution in the Philippines," World Employment Programme Research Working Paper No. 26, Geneva: International Labour Organization.