

USE OF HEALTH CARE SERVICES IN CAMEROON

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Abstract:

The current note summarizes the findings of our nested Logit analysis of the use of health care services in Cameroon. The objectives of that analysis were: (i) identify the determinants of the choice of health care providers in Cameroon, and (ii) determine the compensation to the poor to get them away from traditional/self healing. For that purpose a nested Logit model was built to account for the poor's decision in terms of a Spline function of consumption. Overall, the majority of the determinants had the expected sign with a significant effect.

Keywords: Health care providers, indirect demand, compensation, poverty, spline function, nested Logit model.

JEL Classification: I1; I3; C4

1. Introduction

Despite the key role of health care in defining an equitable labor-using growth, the government of Cameroon, like many other African countries, had to put in place a health cost recovery system as of the early 1990s. Of course, Gertler and Hammer (1997) point out that the combination of general government budget financing of health-care and user fees affects how public subsidies are allocated across programs and who gets the subsidies. But, as poverty incidence increased over the 1990s, means rather than quality of services should explain the demand for health-care services.

We therefore sought to know: i) if the poor would turn away from traditional/self healing if they get compensated for the poverty line; and ii) what the amount of the compensation could be. Using a nested Logit model defined on a spline function of consumption to account for poverty, first we identified the determinants of the choice

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of health care providers, and second we simulated the increases in the poverty lines that are necessary to compensate the poor out of traditional/self healing. But, it appeared necessary to start by presenting the specificities of the health care providers in terms of users' costs.

2. Consultation costs by provider

Overall, individuals' recourse to health-care services in Cameroon is satisfied through, either government hospitals, public health centers, confessional hospitals, private pharmacies, private doctors, religious health care centers, or street or market vendors.

Indeed, a survey conducted by OCEAC¹ in 1997 indicated that for any disease in Cameroon, individuals resort, first to the structured health-care system (47%), then to self-medication (44%), and accessorily to relatives (8%) and to traditional healers (1%). A similar pattern is found by Kamgnia (2001) in the case of malaria treatment in Yaounde, in a blend of modern health services (41%); self-medication (44%); traditional healers (10%); no-treatment (2%); others (1%). As regard antenatal care, 79% of the observed cases in the 1998 DHS have been satisfied by modern health-care services, while 20% resorted to self-medication and 1% to traditional services (Ministère des Investissements Publics et de l'Aménagement du Territoire; 1998).

The database for the current study, ECAM II (2001), defines 10 health-care providers, which we further grouped into 6 categories: Public Referral hospitals, Public Provincial Hospitals, Public Dispensaries, Private Confessional, Private Laic, and Traditional. In general, public health services are the primary source (49.6%) of health-care for the households, followed by the private sector (32.4%), and finally the traditional sector (18.0%). In the public sector, households resort the most to the peripheral medical centers

¹ OCEAC stands for Organisation de Coordination pour la Lutte contre les Endémies en Afrique Centrale, that is the Coordination Organization for the Fight against Endemic Diseases in Central Africa (COECA)

(PuP.C.) which mainly comprise dispensaries that are being used by 36% of the households. That is the case, given that those services are the most accessible to households in terms of the cost (as evidenced by Table 1), and their reach.

Table 1: Consultation costs (cfaf) by service providers

Health care Provider	Minimum	Maximum	Mean	Std Deviation
Referral Hospitals	0	60000	2758	4370
Provincial Hospitals	0	15000	969	1257
Peripheral Health Centres	0	20000	600	771
Laïc Private institutions	0	60000	1597	3236
Confessional Private	0	20000	938	1419
Traditional	0	30000	260	1158

Source: Author's construction based on ECAM II

In total, one could think of three main alternatives as far as health care delivery is concerned in Cameroon: the public sector, the private institutions, and traditional/self-medication. The primary concern then is to find out the extent to which costs or user fees in the modern sector (public and private) push the utilization of health care towards services in the traditional sector, while the reduced quality and lack of respect in public institutions (hospitals and dispensaries) might have encouraged people to seek care from the private institutions.

2. The choice of health care providers with income effects

The basic model is a two-component model: a nested Logit defines the framework for the identification of the determinants of the choice of health care providers, and a specification of a Spline function of consumption within the Logit model allows to account for the behavior of the poor in the choice of health care providers.

2.1. The Logit Model. Following Gertler, Dorr and van der Gaag (1988), we depart from U_{ij} , the level of the utility a patient i associates with a visit to provider j ($j = 0$ for traditional—

medication, $j= 1, 2$ for *confessional health centers and Laic health institutions*, and $j= 3, 4, 5$ for *Public Dispensaries, Provincial Hospitals, and Referral Hospitals, in the current paper*). Such a utility is specified as the sum of two components: a deterministic effect V_{ij} and a random effect ε_{ij} . V_{ij} is a function of the characteristics of both the patient/household i and the provider j , that are supposed to be observable by the researcher. The random component ε_{ij} is a conception of the researcher, which is known only to the patient. Globally, U_{ij} is maximized conditional on the choice of the provider, and is a function of variables that are exogenous to the patient, hence defines a conditional indirect utility function. The specificity of the considered utility is that it pools together the consumption habit of the individual and his attitude vis a vis the quality of the service. While consumption is led by income net of the purchase of health care services, that is $y_i - p_{ij}$, the quality of provider j is defined as a linear function of the vector of attributes of the individual, X and the characteristics of the providers Z_j .

Finally, based on the development of Sahn et al. (2002) on the one part, and on the analysis of Dushesne (1998) on the other part, and given that a sick person starts by resorting to self-medication before considering other care facilities, a residual utility is thought of and the following specification is obtained:

$$U_{ij} = \beta_{0j} + \beta_{1j}x_i + \alpha_1 \left(-\frac{p_{ij}}{y_i} \right) + \alpha_2 \left(2 \frac{p_{ij}}{y_i} \text{Log} y \right) + \varepsilon_{ij}$$

where y_i is the income of the individual and p_{ij} is the price of health-care services².

² Indeed, following Grossman in his extension of the neo-classical consumer theory and Gary Becker's human capital model the individual is thought of as maximizing an inter-temporal utility function, given a time constraint. Such a utility is defined on an initial stock of health which depreciates over time at a rate that depends on the age of the individual, while accelerating in the later period of the life time of the individual. When perceived as a pure investment, health-care is modelled as a derived demand from the demand of good health; given that it is consumed in order to produce good health. But health-care can be conceived as a consumption

The point then is that a sick person will decide for the health care provider that maximizes his utility; that is, a provider j would be chosen over a provider k , if

$$U_{ij} > U_{ik}, \text{ for } j \neq k; \text{ in that case, } hp_{ij} = 1, \text{ but } hp_{ij} = 0 \text{ otherwise.}$$

Those utilities are not observed. But, the provider to be chosen is the one that yields U_{ij} . Within that framework, the individual first chooses a health sector out of three sectors (traditional, private and public), and then within the selected sector, he will choose a service (one out of two from the private sector and one out of three from the public sector).

Furthermore, assuming that the error terms are drawn following a generalized extreme value cumulative density function, then in the current case of a two-level nested Logit model, letting the index l define the first level alternative (Health care sector) and q the bottom-level alternative (Health care service), we would be determining the following probabilities:

$$P_{lq} = P_{q|l} \cdot P_l = \frac{e^{\beta' x_{2q/l} + \gamma' x_{1l}}}{\sum_l \sum_q e^{\beta' x_{2q/l} + \gamma' x_{1l}}};$$

$$P_{q|l} = \frac{e^{\beta' x_{2q/l}}}{\sum_{q=1}^{J_2} e^{\beta' x_{2q/l}}}; P_l = \frac{e^{\gamma' x_{1l} + \tau_l I_l}}{\sum_l e^{\gamma' x_{1l} + \tau_l I_l}};$$

which are respectively the probability that a health provider is selected within a given health sector, the probability that a health

good, in which case health condition increases the utility derived from the consumption of other goods. Good health and health-care are interrelated in the consumption approach of health-care analysis, and the older the individual gets the more means he devotes to alter the depreciation of his health condition.

provider is selected conditional a health sector was chosen, and the probability of choosing a health sector. The term

$$I_l = \ln \sum_q^{J_2} e^{\beta'x_{2q|l}}$$

specifies the inclusive values³ for alternative l (Greene, 2003; Maddala, 1994).

More specifically, x_1 specifies the vector of explanatory variables determining the choice of the sector of health services such as: 1) Education; 2) Household size; 3) Revenue; 4) Type of illness, 5) Age of the household head and 6) Gender. x_2 that defines the vector of explanatory variables in the choice of the service providers, comprises: 1) Consultation cost; and 2) the motive (Nearness) for the choice of the service. In the specific case of age, a J type of relationship is generally found between expenditures on health-care and age: the expenditures tend to be high at birth, decrease at adolescence, then increase rapidly over the fifties. As concerns revenue, its partial effect was found to be minor in developed countries, given that hospital care is sought only in acute illness (Majnoni d'Intignano, 2001). The cost effect is usually thought of as a composite revenue and substitution effects. The revenue effect is the highest among the poorest and the substitution effect depends on the acuteness of the illness, and the socio-economic condition of the household; such that the global cost effect would be negative if the revenue effect dominates and positive otherwise.

2.2. Accounting for Poverty.

The analysis of the demand for health-care services along with poverty issues is done based on the P_α indices⁴.

³ The inverse of those inclusive values defines the sigma values ($0 \leq \sigma \leq 1$), quantities which are necessary to appreciate the degree of dependence. If $\sigma = 0$, one falls under the case of independence and $F(\varepsilon_1, \dots, \varepsilon_5)$ reduces to the product of five type I extreme-value distributions, hence specifies the case of independent Logit (Amemiya, 1981).

⁴ Foster, James, J. Greer, and Erik Thorbecke, 1984, "A Class of Decomposable Poverty Measures," *Econometrica*, 52: 761-765.

$$P_{\alpha} = \frac{1}{n} \sum_{i=1}^q \left(\frac{z - y_i}{z} \right)^{\alpha}$$

Indeed in that expression, the quantity $\sum_{i=1}^q (z - y_i)$ defines the total amount to be transferred to the poorest to bring them above the poverty line z , each individual being granted the positive value of $(z - y_i)$. Hence following Morey et al. (2002), a piece-wise linear Spline function of $(y_i - p_{ij})$ is specified considering two cases:

$$\begin{aligned} \text{Net income} &\equiv (y_i - p_{ij}) \text{ if } (y_i - p_{ij}) < z; \\ \text{Net income} &\equiv (y_i - p_{ij} - z) \text{ if } (y_i - p_{ij}) > z. \end{aligned}$$

On a practical ground, the lower and upper poverty lines, the z values, are used as thresholds whose variations allow modifying the behavior of the individual vis a vis the health care provider. More specifically, the amount of compensation is determined as the percentage increase in the z values necessary to change the sign of the coefficients of the income variables in the Logit model.

3. Analysis of the Differences among Households in the Choice of Health Care Providers

Variables considered in explaining the choice of the health service providers (final decision) are mainly consultation cost (Ln cost) and the nearness of the service. The Log of age of the household head (LnAge) and its square, gender (equals 1 if male), milieu of residence (Milieu Resid equals 1 if urban), sector of activity as specified by Activity FS (Formal Sector equals 1 if activity in the formal sector) and Activity IFS (Informal Sector equals 1 if activity in the informal sector)⁵, motives for choosing the service (Curative disease, Wound/accident, Antenatal)⁶, and the level of instruction (Illiteracy equals 1 if illiterate) are defined in explaining the choice of the health sector.

⁵ The reference modality is unemployed.

⁶ Other diseases stand as the reference group for the 3 reason dummies.

The specified models were estimated, based on ECAMII⁷ using the eighth version of STATA. Overall, the results (Kamgnia 2007) showed that the Independence of irrelevant (IIA) assumption between public services (taken as the reference health sector) and the alternatives of other services is weak, thus supporting the evaluation of a nested (heteroscedastic) Logit model. The majority of the coefficients is not only significant but also has the expected signs. But in order to be specific on the various effects, we differentiate the effects of the households' characteristics from those of the health service providers.

3.1. The specificities of service providers. The effects of two of the characteristics of the service providers, consultation cost and nearness of the service, were tested in the study. While consultation cost significantly and negatively affects the predictions of the choice of service providers, nearness of the service has a positive and significant effect. As concerns cost, we would admit the dominance of its revenue effect, hence a strong welfare impact of health services in Cameroon. That could not have been otherwise in a context of generalized poverty and increased incidence as well as poverty spread and severity. Traditional healing and self medication has then grown to become the primary recourse for a number of diseases including HIV/AIDS.

Concerning nearness, it was indicated as the third most determinant motives for resorting to health care services in

⁷ For such a purpose, the country was divided into 22 strata of which 10 are rural and 12 urban. The questionnaire that was administered was of about 40 pages long and comprised questions organized into 15 sections. These sections are: (01) composition and characteristics of the household; (02) health of the household members; (03) education of the household members; (04) activity status of household members; (05) fertility of 15-49 of women of years old and over; (06) anthropometry and vaccination coverage; (07) lodging and equipments; (08) migration of the households; (09) access to basic infrastructure; (10) living condition assessment; (11) Non-agricultural family enterprises; (12) material and financial wealth, savings and social capital; (13) agriculture and rural activities; (14) non-consumption expenditures; (15) daily expenditure of the households. While section 01, 02, and 03 involved every member of the household, sections 04 to 06 concerned specific member of the households. The remaining sections were meant to collect information on the household as a single unit.

Cameroon (Table 2). If we should get into choice details of health care providers (Table 2), then households would first go to the public peripheral health centres, then to the private confessional centres, but resort last to the public referral hospitals. Of course, it has always been a policy option to get public health centres closed to the households, even in rural areas, in order to secure a good degree of Cameroonians' accessibility to public health services. Fortunately, households appreciated the cost as well as the quality of those services, as revealed by Table 2.

Table 2: Distribution of households by health-care providers and motives of the choice

Health care Provider	Bearable cost	Nearness	Family choice	Quality of services	Others	Total
Referral Hospitals	56	28	1	224	87	396
Provincial Hospitals	205	136	14	494	199	1048
Peripheral Health centres	918	1549	27	976	495	3965
Private laïc	241	325	20	518	549	1653
Private confessional	344	421	40	791	281	1877
Traditional	1022	279	188	135	375	1999
Total	2786	2738	290	3138	1986	10951

Notes: values are absolute frequencies. For the test of independence one has: Pearson Chi-Square= 2655.35 with 20 degrees of freedom and a probability of 0.000. Source: Author's construction based on ECAM II

3. 2. The socio-demographic differences among health care users.

If the differences in the percentages of males and females per health services appear minor, the Chi-square test indicates the rejection of the null hypothesis of independence between health-care provider and gender, as shown in Table 3.

Table 3: Distribution of households by health-care providers and gender

Health-care Provider	Male		Female		Total	
	Frequency	Percent	Frequency	Percent	Frequency	Percent
Referral Hospitals	285	3.4	111	4.2	396	3.8
Provincial Hospitals	793	9.6	255	9.5	1048	9.6
Peripheral Health centres	3046	36.8	919	34.4	3965	35.6
Private laïc	1261	15.3	392	14.7	1653	15.0
Private confessional	1340	16.2	537	20.1	1877	17.1
Traditional	1542	18.7	457	17.1	1999	18.2
Total	8276	100.0	2675	100.0	10951	

For the test of independence one has: Pearson Chi-Square= 27.04 with 5 degrees of freedom and a α probability of 0.000. Source: compiled by the author from ECAM II Source: Author's construction based on ECAM II

Indeed, following the nested Logit analysis (Kamgnia , 2007) males prefer the public sector to private modern services, but will choose the traditional healing over public services. Of course, some tradi-practitioners declare to be able to cure more than 500 diseases, while others say that they can arrest the devil. But, a number of traditional healers are connected to certified researchers who can attest of their abilities and patients who have been cured tend to bear witness of their efficacy. Hence, in the event of HIV/AIDS and the mounting publicity, tradi-practitioners have become an important recourse for the treatment of diseases that are specific to male.

The relationship between the milieu of residence and health-care providers revealed strong as well, as indicated by the rejection of the null hypothesis of independence at the 1% significance level (Table 4).

More interestingly, the nested Logit fit (Kamgnia, 2007) shows that living in the urban areas is an incentive to choose the public sector over both the private services and traditional healing. The J type of relationship between age and health care was significant only

in the traditional equation of the nested Logit model (Kamgnia, 2007).

Table 4: Distribution of households by health-care providers and milieu of residence

Health-care Provider	Urban		Rural		Total	
	Frequenc y	Perce nt	Frequenc y	Perce nt	Frequenc y	Perce nt
Referral Hospitals	357	7.2	39	0.7	396	3.8
Provincial Hospitals	818	16.5	230	3.8	1048	9.6
Peripheral Health centres	1209	24.4	2756	46.0	3965	35.6
Private laic	1150	23.2	503	8.4	1653	15.0
Private confessional	766	15.5	1111	18.5	1877	17.1
Traditional	648	13.1	1351	22.6	1999	18.2
Total	4948	100.0	5990	100.0	10951	

Notes: For the test of independence one has: Pearson Chi-Square= 1668.62 with 5 degrees of freedom and a α probability of 0.000.

Source: compiled by the author from ECAM II.

Finally, up to a 46% increase in the lower poverty line along with a 14.47% increase in the upper poverty line (Table A1, A2, and A3 in Kamgnia, 2007), the poor would choose the confessional private health services, as well as traditional healing/self medication over the public health care services. But an increase in the lower poverty line by 46.20% while maintaining the upper line at a 14.47% (Table A4, Kamgnia, 2007), moves the poor away from the traditional healers to the public sector.

5. Conclusion

Based on a nested Logit model adjusted for a spline function of consumption, our paper first identified the determinants of health care providers, and then determined that the poor households could turn away from traditional/self healing to the public health care facilities if they get compensated for at least 46.20% of the lower poverty line, while the intermediate group receives a compensation of at least 14% of the upper poverty line.

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