Analysis of Health Care Utilization in Côte d'Ivoire

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Abstract

Health constitutes a sufficiently solid entrance to reduce poverty and promote economic growth. Yet, in most African countries and particularly in Côte d'Ivoire, the populations' state of health has seen a real deterioration over the last decade. This study seeks to explain this decline by determining the explanatory factors of recourse to health care providers. To this end, the multinomial logit model is used. The theoretical basis for this analysis is the maximization of a utility function to produce health. The data to test the study's hypotheses came from the survey of the National Institute of Statistics, entitled Social Dimension of Structural Adjustment, carried out in April 1993. The results show that the education level of the household head, the household's income, the price of medication, and the time to reach the health care provider (as a proxy for the distance to a health care provider) determine the choice for a specific health care provider. The level of education and the income positively influence this choice, while the cost of medication and the time to provider (time to reach the health provider) negatively influence the choice of health care provider.

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1. Introduction

Health constitutes a solid entrance for poverty reduction and promotion of economic growth. Yet, in most African countries and particularly in Côte d'Ivoire, the state of health has been deteriorating over the last decade. Access to primary health care has remained difficult for both urban and rural populations. Recourse to traditional healers and, even more frequently, to self-medication are, among others, the way for people to cure themselves.

Some physical, cultural and financial constraints may limit recourse to medical health care providers even when services are available (Penchansky and Thomas, 1981). In fact, leaders of African countries after indepence promulgated ambitious plans to set up education for all, build prestigious universities and put in place modern general medical services. However, resources were never sufficient to enable the fulfilment of these plans. As a consequence, African countries face constant shortages of medical doctors, nurses and local auxiliary staff. With the public finance and exchange crisis of the 1980s, the need for financial resources worsened in most developing countries. Accordingly, countries followed a policy of public expenditure reductions, and especially those devoted to the health sector (Mariko, 2003).

Anxious to improve the health situation, the authorities in developing countries, in agreement with the World Bank, initiated a "cost recovery" policy aimed at supplying health facilities with essential medicines at a cheap price, for which patients were expected to pay and then, with the profit made, provide additional services. Focused primarily on consultancy and hospitalization fees (Russel and Gilson, 1997), this policy was justified by empirical studies showing that the demand for health care was non-elastic vis-à-vis prices (McPake, 1993; Akin et al., 1985; Heller, 1982; Birdsall and Orivel, 1983; Jimenez, 1985), meaning that patients would wish to pay for better quality of health care. Both UNICEF and the World Health Organization (WHO) made this policy the basis of their own strategies for accomplishing the "Bamako Initiative" implemented in 1987 in Bamako (Mali), owing to the insolvency of the system of free health care. The slogan of this policy was "Access to health for all in 2000". To that end, the main objective was the equitable distribution of resources to ensure access to health care for the majority of population (Ridde, 2004:6).

Unfortunately, by the 1990s, the limits of that policy started showing. The lack of health care quality in public health facilities led people to seek medical services from private health facilities at whatever the cost (Deininger and Mpuga, 2004). This observation has been made by several empirical studies, among which are Akin and Hutchinson (1999) for the case of Bangladesh and Killingsworth et al. (1999) for Cameroon.

The cost recovery policy was criticized by some owing to its negative impact on equity (McPake, 1993; Creese, 1991; Gertler and Van der Gaag, 1990; Gilson et al., 2000). It was argued to be discriminatory on the basis of patients' income (Buor, 2004; Meuwissen, 2002; Makinen et al., 2000; Juillet, 1999) in so far as the poor would bear more the consequences of health care payment by the rich (Ridde, 2003).

In Côte d'Ivoire, the National Health Development Scheme (PNDS) is charged with the delivery of health care services. Despite the efforts of the PNDS, the quality of health care and the efficiency of the health system are still an acute problem. Moreover, the already low rate of utilization of health facilities remained unchanged over the period 1995-2000, at an estimated 22.5%. This national average rate masks big disparities across the various regions of the country. Five districts[1] had a rate of 30% in 1999-2000, while two districts (Grand-Bassam and Agnibilékrou) had a rate higher than the threshold rate of 30% in 2000. Conversely, eight districts[2] had a rate of only 5.4%. Furthermore, the rate of birth attended by skilled health personnel slid from an estimated 36.5% in 1999 to 35% in 2000 (MSSP[3], 2000). As a consequence, the country's mortality rates have remained high: the crude rate of mortality is 14 deaths per 1,000 inhabitants. Maternal mortality ratio is estimated at 597 deaths of women per 100,000 live births, while the infant mortality rate was estimated to be 103 per 1,000 live births.

In addition, the quality of medical staff leaves a lot to be desired. Measured by the number of medical personnel (Akin et al., 1995; Lavy and Germain, 1994; Mwabu et al., 1993), we can apprehend it here by the number of medical personnel per inhabitant. Actually, the ratio of medical doctors per person is 1 to 9,739 inhabitants, that of nurses per person is 1 to 2,374 inhabitants, the number of midwives per woman in age to procreate is 1 to 2,081 women.

The cost recovery policy only had a beneficial effect on the functioning of the health system and morbidity. It brought about an average increase of 17.7% in surgical activities between 1996 and 1998, and an average annual fall of 18.3% in cases of pertussis (whooping cough) from 1995 to 1998 (MSP,[4] 1998). It did not significantly improve the number of people going to health facilities for medical treatment, nor did it improve the quality of medical personnel. For example, in 2002, health care provider[5] ratio was estimated at 1 provider for 9,602 inhabitants. Such statistics motivated this study on health care use. Indicators of the state of health (rate of people going to health facilities to seek medical treatment, rate of mortality) show that the use of public health services is low in Côte d'Ivoire. The situation is a matter of great concern for the country's leadership, who increasingly want to know which type of services are preferred by the population. As such, a detailed analysis of the choices of the different layers of population will enable the authorities to have a better understanding of health problems in the country. Accordingly, the main objective of the study is to analyze the determinants of health care utilization in Côte d'Ivoire.

2. Health situation in Côte d'Ivoire

The mission of the PNDS is to enhance the state of health and social welfare by quantitatively and qualitatively adjusting the supply of health services to population's needs. The scheme is seriously under-funded. The lack of sufficient funding for the public health sector has had an impact on the adequacy of human resources in the health sector, and the extent of health care coverage, and ultimately the health of the population. The following sections review the basic health state of people in Côte d'Ivoire and the availability of facilities and human resources needed to deliver health care services.

State of health in Côte d'Ivoire

Because of its geographical location,[6] Côte d'Ivoire is prone to certain endemic diseases such as malaria and meningitis, which are among the main causes of population death. In terms of trends, mortality which remains high, declined steadily over the 1958-1994 period, and then rose until 1998. Specifically, the crude rate of mortality fell from 28% in 1965 to 17% in 1975, and then to 13% in 1988. It reached 14.2% in 1998 (MSSP, 2000).

Since 1999, Côte d'Ivoire has experienced major socio-political unrests (military coups and repetitive attempted coups d'état) and has been in a state of war since 19 September 2002. The crisis has caused an increase in the crude rate of mortality from 14.3% in 1999 to 14.4% in 2000, say an increase of 0.1%. In 2004, the probability of men dying between ages 15 and 60 was estimated at 585 per 1,000 inhabitants. This probability is of about 500 per 1,000 among adult women aged 15-60 years. These figures are higher than the average figures for Africa, which are respectively assessed to 519 and 465 per 1,000 among adult population of men and women (WHO, 2006a).

The maternal mortality ratio (MMR) also remains high. From 597 deaths per 100,000 live births in 1994, it rose to 690 deaths of women per 100,000 live births in 2000, an increase of 93 deaths per 100,000. This situation is, among other things, due to too precocious, too close and numerous pregnancies, shortage surveillance of pregnancy, labour and poor quality of obstetrical care. However, Côte d'Ivoire's MMR was lower than Africa's average in 2000, which was about 910 deaths per 100,000 live births for the same year. Moreover, it should be noted that neonatal mortality, which was 97 deaths per 1,000 in 1994, is essentially due to foetus suffering neonatal infection, premature births and respiratory distress. This ratio is estimated at 65 per 1,000 live births in 2000. Despite the improvement, this figure is still higher than those of Africa (43 per 1,000)

and Southeast Asia (38 per 1,000). Infant mortality rate (IMR) rose from 103 deaths per 1,000 live births in 1978 to 113 in 2000, and then rose to 118% in 2004. This rate is also higher than Africa's average of 100 deaths per 1,000 in the same year. It is also important to note that Côte d'Ivoire's IMR has not stopped rising in recent years. It was about 92.6 in 1995, 96.6 in 1996 and 99.9 in 1999 (MSSP, 2000). In short, it is clear that mortality is very high in the country.

With regard to morbidity, infectious and parasitic diseases represent 50-60% of morbidity, and dominate the country's epidemiology. In addition, this epidemiology is characterized by the persistence of diseases such as malaria, tuberculosis and AIDS.

In Côte d'Ivoire, the overall prevalence of HIV/AIDS was estimated at 7% in 2003 among adult populations. This rate is noticeably equal to that of the African region of the World Health Organization, assessed at 7.1% (WHO, 2006b). The number of people living with HIV was estimated at 570,000 in 2003, and AIDS has become the leading cause of death among the adult population in Côte d'Ivoire. Despite the improvements, Côte d'Ivoire is one of the most affected countries in West Africa, and one of the 15 most affected countries in the world (WHO, 2004). In 2005, the national rate of HIV/AIDS infection among adults aged 15-49 years was estimated at 4.7%. This rate is below sub-Saharan Africa's average assessed at 5.0%. This is a significant decline in the national adult prevalence rate, which was 9.7% (higher than that of sub-Saharan 5.8% in 2000). Furthermore, HIV surveillance among pregnant women shows that its prevalence is on the decline, at least in urban areas, where it fell from 10% in 2001 to 6.9% in 2005 (WHO, 2007).

Malaria, however, is a disease that is the first one to send people for medical consultation at basic health facilities, and is the leading cause of mortality among children under five years of age, according to the National Programme for the Fight against malaria (PNLP, 2002). Malaria represents about 10% of deaths at the national level. It accounts for at least 60% of medical consultations at health establishments, 46% of consultations at paediatric services, and an inpatient mortality rate of 7% to 25%. In addition, malaria is the cause of 40% of cases of absence from work and 50% of cases of loss of farm income, according to the National Institute of Statistics (INS, 2004). In 2000, malaria accounted for an estimated 20.5% of deaths of children under the age of five. This rate is higher than that of the WHO Africa region, which is about 17.5%. Yet, the malaria prevalence rate has remained stable compared with previous years, with the most affected regions being Agnéby, South Bandama and Middle-Comoé. In 2002, there were 1,056,691 cases of malaria recorded, against 1,041,647 in 2001, which corresponds to an incidence of 60.5% and 61.5%, respectively. The Lagoons region, where 423,133 cases were recorded, was the most affected in 2002 (INS, 2004).

Tuberculosis (TB) is an increasing public health concern in Côte d'Ivoire. TB incidence stands at 110 cases per 100,000 people and the annual infection risk is estimated at 3.5% in Abidjan and 1.5% in the interior of the country. The HIV/AIDS epidemic is contributing to the increase in TB. In 2002, the HIV prevalence among TB patients was estimated at 6%, with 16,360 new cases recorded, and the twin TB/HIV infection was estimated at 46% of TB patients' cases in 2003. The confluence of the two diseases requires that particular measures should be taken to take care of these patients. This is especially the case since the national coverage by directly observed therapy/short course

(DOTS) was only 63% in 2002 (INS, 2004). Moreover, the number of deaths from TB among HIV-positive people is 67%, while it is 37% among HIV-negative patients. These figures are higher than the WHO Africa region's average of 53 and 28 cases, respectively (WHO, 2007).

In addition to these three diseases, there are others that contribute to worsen the health situation in Côte d'Ivoire. Among them are acute respiratory infections (e.g. pneumonia), pertussis (whooping cough) and measles. They are increasing and the regions most affected by them are those in the north of the country (Savannah, Denguelé, Worodougou and the Bandama Valley). Diarrhoeal diseases affect all regions of the country.

Health service delivery

Despite the increase in the expenditure allocated to investment in the recent years, the evolution of the indicators of health coverage in the country is not satisfactory, especially with reference to PNDS targets. Here, we look at the availability of health care facilities and the human resource in the health care system.

Use of health facilities

Analysis of the use of health services looks at the rate of medical consultations, or visits to health facilities, to seek medication. This rate is the proportion of people who went to an health centre at least once in the reference year, as summarized in Table 1 over the period 1997-2002.

Table 1: Use of health facilities in Côte d'Ivoire

Years	1997	1998	1999	2000	2001	2002
Rate of use of medical establishments	26.3	22.5	20.6	21.1	22.3	20.4

Source: MSSP, 2000; Ridde, 2004; Institute of National Statistics (2004)

The table shows that the rate of use of the first-level facilities decreased over the period under study from 26.3% in 1997 to 20.42%[7] in 2002. On average, this rate varied around 22.2%. It was estimated at 22.5% in 1998, 20.6% in 1999, 21.1% in 2000, and 22.3% in 2001 (INS, 2004). These rates are low compared with PNDS expectations.

Number of health facilities

In 2002, Côte d'Ivoire had 48 national hospitals, 17 regional hospitals and 4 teaching hospitals. There was one public hospital per 253,064 inhabitants. This ratio has declined compared to 2000 where it was one public hospital for 237,678 inhabitants. All the country's regions have at least one state-run regional hospital, except for Lagunes and Bandaman Valley. Instead, there are 11 national hospitals in Lagunes region and 5 in Bandaman Valley; only Baffing and Denguélé regions have no national hospitals.

The total number of functional primary health care establishments (ESP) decreased from 1,338 in 2000 to 1,246 in 2002; that is 1 primary health establishment (ESP) for

14,014 inhabitants in 2002, versus 1 for 12,257 in 2000. The aim of PNDS was to have 1 primary health care establishment for 10,000 inhabitants by the year 2005. There were 458 ESP in urban areas and 788 in rural areas. Table 2 summarizes the types of health care facilities in Côte d'Ivoire.

Table 2: Structure of health facilities in 2000

Types of health facility	Number
Teaching hospitals (CHU)	4
National specialized institutes	9
Regional hospitals (CHR)	17
General hospitals (HG)	48
Urban health units (FSU)	10
Community-based FSUs (FSU-COM)	39
Urban health centres (CSU)	300
Specialized urban health centres (CSUS)	109
Rural health centres (CSR: dispensaries + maternity wards)	405
Rural dispensaries and maternity wards	383

Source: INS (2004)

Furthermore, bed occupancy rates at the national hospitals are low on average, and have generally been declining since 1999. In 2002, however, the partial average rate was 24.2%, versus 22.1% in 2001, which represented a 2.1% increase. This ratio was expected to improve in 2002 as the number of hospitalization days increased by 40%; that is 167,220 versus 119,443 in 2001. The highest rates were observed in the Bandaman Valley region, especially at Katiola with 60.9%, and at Zuénoula in Marahoué with 60.2%.

Human resources

The quality of a health system is in part measured by the adequacy of human resources at its disposal (Donabedian, 1988). The endowment in human resources of Côte d'Ivoire has not always been satisfactory, especially in the regions controlled by the "New Forces". However, we note that health care coverage ratios slightly increased in 2001, although they remain far from the PNDS targets. In fact, the population/doctor ratio was estimated at 9,601 in 2001, versus 9,730 in 2000. This is still short of the PNDS objective to achieve coverage of 1 medical doctor for 9,000 inhabitants in 2001, and 1 for 6,600 by 2005. With regard to nurses, the ratio was 1 nurse for 2,340 people in 2001, versus 1 for 2,374 in 2000. As for midwives, the ratio was 1 for 1,802 in 1999 and 1 for 1,980 in 2001; that is a 9.9% increase (INS, 2004). The distribution of the medical human resource is also characterized by its sharp concentration in the big cities of the country.

Traditional medicine

The supply of health care is insufficient in Côte d'Ivoire, and this is so much for facilities, bed capacity and medical staff. This situation has favoured the emergence of traditional medicine.

This type of medicine plays an important role, especially in the rural areas where it

constitutes the main source of medication. Accordingly, a national programme for the promotion of traditional medicine was set up in 2001. The programme has enabled the country to strengthen collaboration between traditional and modern medicine by training 450 traditional healers. The Africa Day for the Promotion of Traditional Medicine, instituted by the WHO in 2003, is now celebrated annually on 31 August by many associations of traditional healers and non-governmental organizations (WHO, 2004).

3. Health care demand model

Socio-economic determinants of the demand for health care can be analysed econometrically on the assumption of random utility maximization (Acton, 1975). This approach has been used by a number of authors (Sindelar, 1982; Alderman and Gertler, 1989) to estimate a health care demand function.

Health care demand is generally estimated by using the ordinary least squares method, the qualitative dependent variables method or the simultaneous equations method. Mwabu (1991) and Sindelar (1982), for example, used ordinary least squares to identify the variables that influence the number of visits to health care facilities, while Acton (1975) used a simultaneous equations model to estimate the determinants of the choice between public and private health care facilities. To analyse the probability of recourse to a medical doctor, Kenkel (1990) applied a probit model. Mwabu et al. (2003) chose the quantile regression method to analyse the effects of urban and rural populations' consulting fees on health care demand. To identify the determinants of health care utilization in Côte d'Ivoire, the current study uses the qualitative dependent variables method, applying the multinomial logit. The model was adopted after testing the hypothesis of independence between irrelevant alternatives (IIA).

Theoretical model and estimation method

Following Gertler and Van der Gaag (1990), let us assume a model in which utility depends on the state of health brought about by the consumption of medical and non-medical goods. The consumption of medical goods improves the state of health, which in turn brings about utility (Phelps, 1995). Demand for health care is thus a derived demand. The benefits to be obtained from consuming medical care are an improvement of the state of health, the resulting cost of medical care, and a reduction of other goods and services consumption.

Let us assume that the perception of the quality of a particular health care option is defined by the state of health brought about by the use of this option. The cost of this option is made up of direct expenses (consulting fees, etc) and indirect costs (transport, cost of the time required to seek medical care). Taking into account this information and disposable income, the patient will choose the option that will provide the highest utility.

The utility brought about by the care received from health care option *j* is given by the formula:

$$U_j = U(H_j, C_j) \quad (1)$$

where H_j is the state of health that an individual obtains by using medical care option j, and C_j is the share of income destined for non-medical goods. In this theoretical framework, the quality of a type of medical care is defined as the difference between the state of health brought about by this care and the state of health brought about by self-medication.

If H_0 represents the state of health obtained without having recourse to any kind of health care, the quality of type of care option j is: $Q_j = H_j - H_0$. This formula brings about a health production function of the form of:

$$H_j = Q_j + H_0 \quad (2)$$

The quality of care option j varies with the provider of this care and can also vary as a function of the characteristics (level of education, age, sex, etc) of the individual using it.

If P_j is the total cost of obtaining the care option j and Y the patient's income, then the budgetary constraint is expressed as:

$$C_j + P_j^* = Y \quad (3)$$

with $C_j > 0$.

Substituting (3) in (1) for C_j, gives the following semi-direct utility function:

$$U_j = U(H_j, Y - P_j^*) \quad (4)$$

Equation 4 shows that income has an effect on utility through the consumption term. The cost of obtaining a particular type of medical care is thus represented by a reduction in the consumption of non-medical services.

If one assumes that the patient has medical care options $J+1$, then the problem of utility maximization will be expressed as follows:

$$U^* = \mathbf{max}\ (U_0, U_1, \ldots\ldots U_j)$$

where U^* is the maximum utility.

The utility function of the patient or of the person who decides to go for medical services is random. It is composed of a deterministic part and a stochastic term. The idea

is that the deterministic part represents the mean value assigned to the option chosen. The random term is the non-observable part of the utility function.

$$U_{ij} = V_{ij} + \varepsilon_{ij} \tag{5}$$

with V_{ij} being the deterministic part of the utility function and ε_{ij} being the random term.

Following Dor and Van der Gaag (1988), let us choose a linear form for the utility function, as it is more appropriate for the maximization of a stable utility function. The utility function will then be expressed as follows:

$$V_{ij} = \beta_{0j} + \beta_j X_{ik} + \alpha(Y - P_j) \tag{6}$$

where X_{ik} is the vector of individual characteristics; Y is the household's income; and $Y–P_j$ is the consumption of non-medical goods.

Considering that treating one's illness oneself without consulting a practitioner (that is self-medication) has no effect, it is set $V_0 = 0$.

The function of demand for a practitioner is the probability that the utility brought about by this option is higher than that of any other option. These demand functions are of the polytomic logit. It is assumed that the stochastic parts of these functions are not correlated, given that each type of medical care has its own characteristic.

The probability of choosing option j rather than option k is defined as the probability that the utility brought about by the first option is higher. This is expressed as follows:

$$\Pi_{ij} = \Pi\,(U_{ij} > U_{ik},\ \forall j \neq k)$$
$$\Pi_{ij} = \Pi\left[\left(V_{ij} - V_{ik}\right) > \left(\varepsilon_{ij} - \varepsilon_{ik}\right)\forall_j \neq k\right] \tag{7}$$

It is assumed that the ε_{ij} are identically and independently distributed (*iid*) according to the Weibull log law (Hosking et al., 1985). It is further assumed that a patient does not choose more than one medical practitioner when having a given illness treated. Thus, the probability that an individual i will choose a given type of care j is:

$$\Pi_{ik} = \frac{e^{V_{ik}}}{1 + \sum_{j=1}^{j} e^{V_{ij}}} \tag{8}$$

The study thus looks at the following options:

- Self-medication
- Traditional healer
- Public provider (a provider in a public health facility)

The study is carried out in the various areas of Côte d'Ivoire, represented by the following regions: Abidjan, Other Cities, Rural East Forest, Rural West Forest and Rural Savannah. The following hypotheses are tested:

1. The level of education of household head and income of household head have a positive effect on the use of modern health care.
2. The time to reach a provider and the cost (of medication) are not favourable to the choice of modern health care.
3. Big families have recourse to traditional healers.

Source of data

The data used in this study came from the survey on the Social Dimensions of Structural Adjustment (DSA) that was carried out in April 1993 by the National Institute of Statistics (MEFP,[8] 1993). Like other DSA surveys, it provides information on the level of education, the size of the household, the cost of medication and the household's income. It also contains other types of information such as the age, nationality or ethnic affiliation, religion, and sex of the patient. All these types of information serve to estimate the model in this study.

The choice of these data are due to the fact that, unlike those from the 1998 and 2002 surveys carried out by the INS, they provide more complete information about the variables to be used in the estimation. For example, although they do not contain the variable "distance", they use "the time to reach a provider" as a proxy for the distance to a health care provider. This variable is omitted in the more recent surveys. However, it is a key factor to check the validity of the hypotheses of this study.

4. Literature review

A number of empirical studies of the determinants of health care demand in Africa in general and particularly in Côte d'Ivoire are available. In general, they make a distinction between economic determinants (Dor and Van der Gaag, 1998) and social determinants of health care demand. Economic determinants are related to considerations of income and prices. In this respect, Alderman and Gertler (1989) indicate that individuals from households with a relatively high income stand a higher probability of seeking medical care than those from poor households.

Price-related results vary according to the nature of the price paid. To that end, Mwabu (1991) concludes, on the basis of a study carried out in rural Kenya, that prices have a qualitative but not quantitative effect on health care demand. He found that a 100% increase in user fees at government dispensaries would reduce the probability of use of these dispensaries by 9%. Through a study carried out in Ghana, Lavy and Quigley (1993) show that although significant, prices of medical services are less important in terms of their effect on the choice of treatment. In contrast, Sauerborn et al. (1994), studying Burkina Faso, point out that health care prices are a deterrent to the use of health facilities.

Besides economic factors, the distance to a health care provider plays an important role in health care demand. On the basis of studies carried out in Eastern Africa, Bryant (1972) reports a close correlation between the proximity of health facilities and their use. He found that in Uganda, the average number of outpatient visits per person to health facilities reduced by half for every 3.2km in the case of a hospital, every 2.4km in that of a dispensary, and every 1.6km in the case of a first-aid post. WHO (1989) asserts that the amount of costs borne by the patient depends on several factors, among them the proximity of the health establishment and the number of steps a patient has to go through to receive drugs or care. The negative impact of distance on health care demand has also been highlighted by Novartis Foundation (2003) in a study conducted in the Ségou region of Mali. It follows from the empirical studies mentioned that being relatively far away from health centres is a deterrent to seeking modern health care.

There are many and diverse social determinants of health care demand. Among them are age, sex and level of education. As part of their analysis of these variables, Gertler and Van der Gaag (1990) show that for both adults and children, the level of education has a non-significant impact on the use of modern health care. In contrast, Ssewanyana et al. (2006) found for Uganda that the higher the level of education, the higher the probability of seeking modern health care.

Specifically for Côte d'Ivoire, in addition to the long waiting time and the poor welcome to patients at health centres, Perrin (2000) determined that the prices of medical

treatment and drugs in Abidjan have a negative impact on the use of modern health care. Also in Abidjan, Juillet et al. (2000) found that the patients who go to community-based health facilities (FSU-Com) for medication are mainly women (66%) and children (26%). They also observed that 61% of those who seek medical care from the FSU-Com had attained at least a primary level of education, while 29% were illiterate.

The quality of modern health care has been identified as a key determinant of its use. Indeed, a number of studies have concluded that improvement of the quality of health facilities would lead to increase in the number of people visiting them for medical care (Gilson, 1997; Baltusseen et al., 2002; Nyonator and Kutzin, 2003; Levy-Bruhl et al., 1997; Audibert and Mathonnat, 2000; Meuwissen, 2002; Chawla and Ellis, 2000; Fournier and Haddad, 1997).

Traditional health care plays an important role in curing patients in many African countries, including Côte d'Ivoire. In a good number of cases, patients prefer traditional medicine to modern medicine in comparison with self-medication. In a study conducted at Odienné and San Pédro, for example, CEPRASS[9] (1995) found that for mental illnesses (which the population considered as mystical), patients chose traditional medicine rather than modern medicine. Some respondents in the study said that they would opt for traditional medicine because at modern health facilities, patients are required to pay before they are treated, while traditional healers can wait until the illness has healed.

Studying mother mortality in Abidjan, Yao (2000) determined that 42% of women recognized the need for regular visits to the hospital for check-ups, but they also thought that traditional medicine could supplement hospital care. The results of a study by Audibert et al. (1998) actually contradicted its research hypotheses. The econometric estimation used in the study showed that the cost of medical care and the distance between the patients' homes and health centres had a significant and positive effect on the demand for traditional and modern medicine as opposed to self-medication.

5. Data analysis

Data related to the household head form the basis of the analysis in this study. The explanatory variables concern the characteristics of the household, the household's head and health care. As such, the sample used contains no child, as the minimum age taken into account was 18 years. The income of the household's head (consumption expenses) has been related to the household. Regarding modern health care, only medical services in public health facilities have been taken into account.

Descriptive statistics

The model's variables are detailed in tables 3 and 4. As noted, these variables were extracted from the 1993 Social Dimensions of Structural Adjustment Survey conducted by INS (MEFP, 1993). The 1993 survey involved a sample of 9,600 households, from which we selected 2,142 households with patients for analysis.

Table 3: Definition of variables

Dependent variable	
Option/choice of type of health care provider	
1	Traditional provider
2	Public health care provider (doctor, medical auxiliary)
3	Self-medication
Independent variables	
Head of household characteristics	
Education	Level of education: illiterate, primary, secondary, tertiary
Age	(18-35 ans), (35-61 ans), (60-95 ans)
Ethnic group	Akan, Krou, Mandé, Voltaic, Foreigner
Gender	Male/Female
Religion	Christian, Muslim, other
Household characteristics	
Size	Size of the household
Income	Household's consumption expenses
Dummy variables (region)	
Region 1	Abidjan
Region 2	Other Cities
Region 3	Rural East Forest
Region 4	Rural West Forest
Region 5	Rural Savannah

continued next page

Table 3 Continued

Dependent variable	
Characteristics of health care	
Price	Price for medication for the household
Time to provider	The time to reach a health care provider less than 1 hour or more than 1 hour

Source: Computed by the author from data of the MEFP (1993)

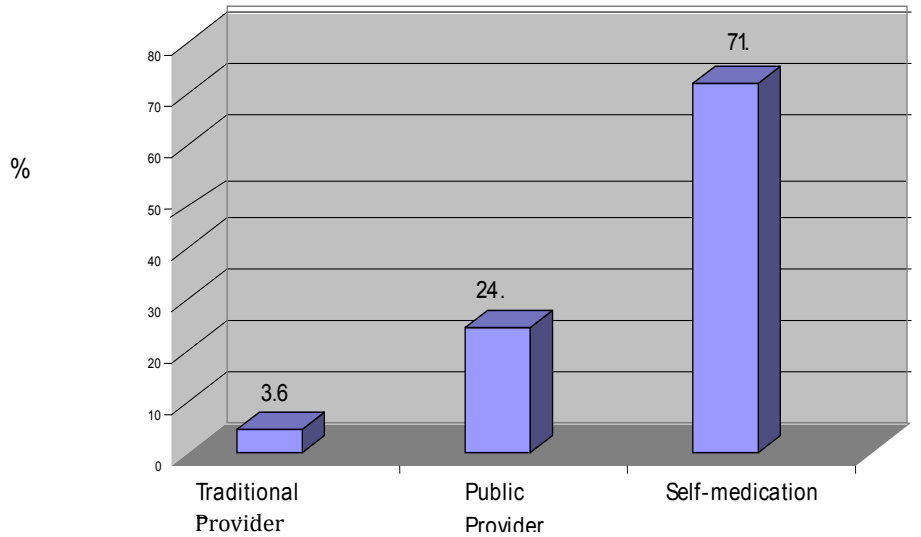
Table 4: Detailed description of variables

Variables	Mean	SD	Min.	Max.	Description
Choice of health care provider	2.6834	0.5369	1	3	
	1	0	1	1	If traditional provider
	2	0	2	2	If public provider
	3	0	3	3	If self-medication
Areas					
Abidjan	0.1848	0.3882	0	1	1 if Abidjan, 0 otherwise
Other Cities	0.3664	0.4819	0	1	1 if Other Cities, 0 otherwise
Rural East Forest	0.2016	0.4013	0	1	1 if Rural East Forest, 0 otherwise
Rural West Forest	0.1185	0.3233	0	1	1 if Rural West Forest, 0 otherwise
Rural Savannah	0.1283	0.3345	0	1	1 if Rural Savannah, 0 otherwise
Age of household head					
Age 18-35	0.1984	0.3988	0	1	1 if Age 18 to 35, 0 otherwise
Age 35-61	0.5228	0.4995	0	1	1 if Age 35 to 61, 0 otherwise
Age 61+	0.2787	0.4484	0	1	1 if Age 61 to 95, 0 otherwise
Religion					
Muslim	0.3809	0.4857	0	1	1 if Muslim, 0 otherwise
Christian	0.3692	0.4827	0	1	1 if Christian, 0 otherwise
Other	0.2497	0.4329	0	1	1 if Other religion, 0 otherwise
Level of education					
Illiterate	0.6629	0.4728	0	1	1 if has ever gone to school, 0 if not
Primary education	0.1461	0.3533	0	1	1 if primary, 0 otherwise
Secondary education	0.1559	0.3628	0	1	1 if secondary, 0 otherwise
Tertiary education	0.0350	0.1838	0	1	1 if tertiary, 0 otherwise
Ethnic group					
Akan	0.3543	0.4784	0	1	1 if Akan, 0 otherwise
Krou	0.1274	0.3335	0	1	1 if Krou, 0 otherwise
Mandé	0.1671	0.3731	0	1	1 if Mandé, 0 otherwise
Voltaic	0.1143	0.3183	0	1	1 if Voltaic, 0 otherwise
Foreigner	0.2371	0.4254	0	1	1 if Foreigner, 0 otherwise
Time taken					
Less than an hour	0.8356	0.3706	0	1	1 if less than 1 hour, 0 otherwise
More than an hour	0.1643	0.3706	0	1	1 if more than 1 hour, 0 otherwise
Gender					
Male	0.7880	0.4087	0	1	1 if male, 0 otherwise
Female	0.2119	0.4087	0	1	1 if female, 0 otherwise
Size of household	5.7889	3.2582	1	21	Number of people in the household
Income	166,831.9	86,402.73	2,717.59	400,567.3	Household consumption expenses
Price	811.7819	355.7453	70	1,850	Price of medication

Source: Computed by the author from data of the MEFP (1993)

As Figure 1 shows, there are large differences in the choice of the three types of medical care: the percentage of those who have recourse to traditional provider was 3.6%, while that of those resorting to public health care provider is 24.46%. This left self-medication as the most used mode by the Ivorian population, with a percentage of about 71.94%.

Figure 1: Choice of health care options (% of people seeking care in 1993)



Source: Computed by the author from data of the MEFP (1993)

The distribution of recourse to different sources of medical care providers by different regions is shown in Table 5. This structure of Côte d'Ivoire's health system is similar to that of Burkina Faso, Benin and Mali (Audibert and Roodenbeke, 2000), where self-medication was found to be the first source of medical care, followed by modern medicine (as sought from public health facilities) and then by traditional medicine. It transpires from this analysis that the use of modern health care is very poor in Côte d'Ivoire.

Table 5: Percentages of medical options by region

Options	Abidjan	Other Cities	Rural Forest East	Rural Forest West	Rural Savannah
Traditional provider	4.29	3.31	2.31	4.33	4.73
Modern provider	45.71	30.70	12.04	11.81	7.27
Self-medication	50.00	65.99	85.65	83.6	88.00
Total	100.00	100.00	100.00	100.00	100.00

Source: Computed by the author from data of the MEFP (1993)

The data in Table 5 reveal the high frequency of use of self-medication across all regions, but in particular in Rural Savannah, where the rate is 88%. The option of seeking medical care from public health facilities comes second, although it is the highest in Abidjan, with a rate of 45.71%. Therefore, many studies on modern medical treatment, among others Emmanuel (2000) and Guessan (2000) were related to the area of Abidjan. The Rural Savannah region had the lowest frequency of use of modern health care, with

a rate of about 7.27%. With regard to the use of traditional medicine, the rates are low across all the regions, but with the Rural West Forest region recording the lowest rate.

Table 6: Percentages of recourse to medical provider by level of education

Option	Illiterate	Primary	Secondary	Tertiary
Traditional provider	3.38	3.20	4.49	5.33
Public provider	18.24	30.35	38.32	56.00
Self-medication	78.38	66.45	57.19	38.67
Total	100.00	100.00	100.00	100.00

Source: Computed by the author from data of MEFP (1993)

The role of education in accounting for such a distribution of use of health care is self-evident. The table clearly shows the impact of education on the type of health care choice. It is the "Illiterate" category that has the highest use of self-medication. Household heads with higher education less likely choose traditional medicine (5.33%), and most likely seek care from public health facilities (56%).

6. Results and discussions

The multinomial logit model used to identify the characteristics of health care and households that influence the type of health care choice was estimated using Stata 9 software. The estimation was done for three options: traditional provider, public health care provider, and self-medication. Self-medication served as the basis for comparison. The results presented in the tables in the Appendix contain standard coefficients, marginal effects and elasticies (for continuous variables).

The Wald test (Long, 1997) is used to test the hypothesis that coefficients associated with two options, m and n, for example, are equal. If the hypothesis holds, then the two options can be combined. However, after testing, the hypothesis is rejected.

The IIA hypothesis is also tested using Hausman's (1978) test expressed as follows:

$$H_{IIA} = (B - b)' \left[\text{var}(B) - \text{var}(b) \right]^{-1} (B - b)$$

The different values derived from this test are negative for all the regions, except for the Rural East Forest. The negative values of the H_{IIA} are evidence that the IIA hypothesis has been proved (Hausman and Macfaden, 1984).

The probability value (14.64) associated with the IIA statistic for "Other Cities" suggests that there is a strong relationship of independence between the three alternatives (traditional provider, self-medication and care from public health provider).

Because of the non-linearity of the multinomial logit model, the results are better interpreted through the analysis of marginal effects. The marginal effects of variable *x* on alternative *k* refer to the probability of individual *i* to choose alternative *k* in response to changes in *x*. Using the functional form $\Pr(V_k = 1)$ of the multinomial logit model, Long (1997) shows that:

$$\frac{\partial \Pr(V_k = 1)}{\partial x} = \Pr(V_k = 1)\left(\alpha_{k,x}\beta_{ij} - \sum_{j=1}^{j} \alpha_{j,x} \Pr(V_j = 1)\right)$$

The marginal effects of a given independent variable depend on its β coefficients and on the other variables.

Effects of household characteristics

The effects of two variables–namely income and size of the household–are analysed to determine their impact on choice of medical care. Their impact on health care demand is seen from public health providers and traditional healers. A detailed analysis of each of these continuous variables will establish the nature of the relationship between these, and the two types of health care providers.

Income

With the exception of East Rural Forest, the results show that income has a positive and significant impact only on the use of public health care. In East Rural Forest region, use of traditional and modern medicine is negatively and significantly influenced by income (consumption expenses). The income elasticity of health care demand varies from one medical practitioner to another in the various regions.

At the national level, in the "Other Cities" and the Rural Savannah, a 1% increase in income is assumed to lead to an increase of 0.668%, 2.37e-06 and 8.60%, respectively, in the rate of seeking modern health care.

For Abidjan, even though income significantly determines the use of traditional medicine, the income elasticity of demand for traditional medicine remains non-significant. The income elasticity of demand for formal health care is 8.18% for the Abidjan area. In East Rural Forest, all other things being equal, the 1% fall in income leads to a reduction in the use of modern medicine by 4.47%, and in the use of traditional medicine by 7.94%.

If one excludes the results for the "Other Cities", where the income elasticity of demand for public health care is very low (less than 0.001), the results show that income plays a very important role in the choice of modern medicine from public health facilities. In sum, these results highlight the need for an individual to have a high level of income to choose public health care. This need is greater when one lives in Abidjan, and even more in Rural Savannah.

These findings are in line with those of Perrin (2000) for Abidjan, but in contrast to this author, they reveal a strong contribution of income in the Rural Savannah region (where households are generally poor), a contribution that is stronger than that of Abidjan. Moreover, owing to a considerable improvement in the level of income (income 2) in the East Rural Forest region, people have recourse for both traditional and modern medicine. For these levels of income, the elasticity of health care demand from modern medical facilities is estimated at 1.78, while that related to the demand for traditional medicine is 3.30. Apart from this region, while the coefficient associated with the square income is significantly negative when it relates to seeking medical care from public health facilities in Abidjan, it is significantly negative for both modern and traditional medicine in Rural Savannah. This situation is explained by the fact that the more the household head is rich, the more he seeks medical care from private facilities where the quality of health care is better than that of public facilities.

Cavagnero et al. (2006) in a study in Argentina show that the rich choose private health care because of the relative value of their income. In the Rural Savannah region of Côte

d'Ivoire, the elasticity associated with this variable is estimated at -2.60 for the case of a traditional provider, and 6.50 for that of modern health care provider. This elasticity is -3.018 in the case of modern health care in Abidjan. Nonetheless, the coefficient associated with income 2 is not significant for the whole country or for Other Cities.

In the light of this analysis, it can be observed that the problem of health care quality in Côte d'Ivoire is real. This is the conclusion to which some of the empirical studies, including those by Ortiz et al. (1999) and Jaffré and De Sardan (2003), pointed out.

Size of household

The analysis of the results related to household size reveals that the coefficient associated with this variable is not significant for both the whole country and the East Rural Forest region. For the Rural Savannah region and Other Cities, household size is significant and positively correlated only with public health care. The elasticity associated with this variable is estimated at 5.72 for the Rural Savannah region, and 0.10 for Other Cities.

For Abidjan, household size is significant and negative in the case of both traditional and modern medicine. For example, a 1% increase in the size of household would lead to a reduction of 2.60% in the probability of choosing a traditional healer, and a decrease of 3.04% in the probability of modern medical practitioner.

The coefficients associated with the variable size 2 are significant and negative only in the case of seeking modern health care for both Other Cities and Rural Savannah. This means that when household size is very high, the given household does not seek medical care from modern health facilities. The elasticity values for Other Cities and Rural Savannah are, respectively, -0.010 and -4.34.

The increase in household size in Abidjan is likely to increase the probability of seeking modern health care to the extent that the coefficient associated with the variable size 2 is significant and positive. For example, a 1% increase in household size in Abidjan would lead to an increase of the probability of recourse to modern health care by 1.108. The sensitivity of the variable size 2 in relation to recourse to a traditional healer is estimated at 1.29. To some extent, the increase in the household size leads to a reduction in the probability of seeking modern medical care in East Rural Forest region. Here, the variable size 2 is significant and negatively correlated with the use of modern health care. At a 10.3% threshold, the sensitivity of the variable size 2 in relation to seeking modern health care is -1.99.

In summary, the overall results support the hypothesis formulated about this variable. That is, when household size becomes too high, most of the households do not send their patients to modern health facilities. They resort to traditional medicine or self-medication.

Effect of household head characteristics

Education level, age, gender, ethnic group and religion are the main characteristics that are analysed in this section. The findings relating to age, gender and household size are in line with those of Hardeman et al. (2004).

Level of education

Education is analyzed through dummies for education levels attained. For the whole country, household heads with primary, secondary and higher education level are significantly more likely to seek medical care from public health facilities. For example, the probability of those with primary education level seeking modern health care from public health facilities is 0.055, while those with secondary education level is 0.069. And when the household head has attained a higher education level, the probability rises to 0.14. It results from this analysis that the more the household head is educated, the more he is likely to seek medical care from public health facilities. It is worth noting that no education level attainment determines recourse to a traditional healer at the country level.

In Abidjan, only household heads with a higher education level are associated with a higher probability of seeking modern health care as regards the marginal effects (0.26). In this region, having primary or even secondary level of education does not significantly determine recourse to modern medicine. In addition, no levels of education determine recourse to traditional medicine in this region.

Results for the Rural Savannah are different from those of the previous strata. In fact, the database used in this study failed to report any head of household with a higher education level in the rural area. Moreover, the proportion of household heads with secondary education level is very low. In this situation, being illiterate household head or having primary education level has a significant effect on the choice of both type of medical personnel. In fact, being illiterate is associated with an increase in the probability of resorting to a traditional healer and/or to modern health personnel in comparison with self-medication. Conversely, when the household head has primary education level, he does not resort to a traditional practitioner. He has recourse to modern health facilities. Accordingly, the probability of seeking modern medicine is almost 1 regarding the marginal effects (0.98).

In both East Rural Forest and Other Cities, the level of education does not determine either the use of modern medicine or that of traditional medicine. However, one may notice that education level appears as a key variable accounting for the utilization of health care in Côte d'Ivoire, and particularly for the region of Rural Savannah. The most educated household heads seek medical care from modern health facilities rather than from a traditional healer compared to self-medication. It results from this analysis that primary, secondary and higher levels of education are associated with the choice of modern medical care at the national level. However, in Abidjan, only the higher education level is associated with an increase of the probability of resorting to modern health care provider. This situation may be due to the presence of the majority of people with a higher education level in Abidjan. This finding is in line with those of previous studies on health care demand conducted in developing countries (see, for example, Hallman, 1999; and Perrin, 2000). Meanwhile, it is contrary to that made by Gertler and Van der Gaag (1990), who pointed out that education level did not have a significant impact on recourse to modern health care.

Age

Both for the whole country and for Abidjan, the age of the household head has a significant and negative impact on the choice of modern health care for those of 18-35 years. Regarding the marginal effects, belonging to the 18-35 age bracket is associated with a reduction in the probability of resorting to modern health care of 0.074 for the whole country, and 0.301 for Abidjan. Furthermore, belonging to old age (more than 60 years) neither determines recourse to modern health facilities nor to a traditional healer compared to self-medication.

In Rural Savannah region, with reference to 18-35 years, old people (more than 60) positively determine the choice of modern health care with a probability of 0.028. Apart from Abidjan and Rural Savannah region, age does not determine the probability of seeking medical care in the other regions. Therefore, age of household head does not have an effect on the choice of traditional medicine.

Gender

The gender of the household head has a significant and positive effect on the choice of modern medical care. Being male is associated with a 0.16 probability of seeking medical care from public health facilities. In contrast to this finding, being male is associated with a marginal increase in the probability of about 0.0002 of resorting to a traditional healer.

Outside the two regions, gender does not significantly determine the choice of both modern and traditional providers in the other regions, and especially at the national level. The contrast between the results for Abidjan and those for the Rural Savannah region can be explained by the fact that the education level is higher in the urban than in the rural areas.

Ethnic group

The ethnic group of the household head is likely to affect the choice of medical care. The results show that belonging to the Akan group has a significant and negative influence on the choice of modern health care in the Rural Savannah region. Being Akan in this region is associated with a 0.012 probability of seeking modern health care. Besides the Rural Savannah region, being Akan is significantly and positively correlated with the choice of a traditional practitioner in Abidjan, though the marginal effects for this variable remain non-significant. Likewise, the same observation holds for the Voltaic group in Abidjan. However, except for Abidjan, being Voltaic does not determine the type of medical care choice for both other regions and the national level.

Belonging to the Krou ethnic group significantly and positively influences the choice of modern health care in Other Cities, with a 0.19 increase in the probability of choosing modern health care compared to self-medication. Not only is belonging to this ethnic group negatively associated with seeking medical care from a traditional healer, it does not determine also the choice of any type of medical care in the other regions.

Findings for the whole country reveal that belonging to the Mandé ethnic group has a significant and negative effect on choosing traditional medicine. At the national level, for example, being Mandé is associated with a 0.19 reduction in the probability of choosing a traditional healer in comparison to self-medication. Belonging to this ethnic group is not associated with seeking a given type of medical care in the other regions. With reference to belonging to the Foreigner group, it must be stressed that this significantly determines the type of medicine to choose. In the East Rural Forest, being a Foreigner is significantly and positively correlated with seeking modern health care; the probability of doing this increases by 0.18 when the household belongs to the Foreign ethnic group. Conversely, the results for Abidjan show that being a Foreigner is negatively correlated with seeking medical care from public health facilities. Being a Foreigner here reduces the probability of going to these facilities to about 0.28.

In sum, the results show that being Krou or a foreigner has only a significant influence in the case of choosing modern health care. While the probability of choosing modern care increases with the fact of belonging to the Krou ethnic group, it varies with region when it relates to Foreigner. Being Krou increases the probability of going for modern medicine in the Rural Savannah region, while it reduces the same probability in the urban area (Abidjan). Being Mandé or Voltaic determines only the recourse to traditional medicine, while the sole Akan group seeks medical care from both modern health facilities and traditional healers.

Religion

Religion is identified as a determinant of recourse to medical personnel through the behaviour of people practising the various religions. Being a Christian is associated with a 0.05 increase in the probability of seeking modern medical care. Likewise, in Rural Savannah region and Other Cities, being a Christian is significantly and positively correlated with the choice of modern health personnel: the probability of going for modern medicine increases by 0.078 in Rural Savannah, while it increases by 0.10 in Other Cities. Outside the two regions, being a Christian does not influence the choice of modern medicine, nor does it influence that of traditional medicine.

As regards Muslim religion, it does not affect recourse to a health practitioner at the conventional threshold (1%, 5%, and 10%). Nevertheless, being Muslim significantly and positively determines recourse to a modern health practitioner at the threshold of 10.2%. In this case, being Muslim is associated with a 0.10 increase in the probability of seeking modern health care.

In Rural Savannah region, belonging to the "other" category of religion is significantly and positively correlated with going for modern medicine: this group is associated with an almost 0.02 increase in the probability of seeking modern medicine.

By and large, the results show that belonging to one of the three groups of religion has a significant effect on the use of modern health facilities. On the basis of the marginal effects at the means, being a Christian is associated with a higher probability of seeking medical care from public health facilities.

Effects of health care characteristics

The price of medication and the time to go to a health care provider remain key explanatory variables of health care demand. High prices for medication may be a deterrent to seeking health care. Likewise, long time to provider (time to get the health care provider) does not promote recourse to a likely practitioner.

Price of medication

Study results indicate that the price of medication is significantly different from zero for all alternatives and for all the regions of the current study. The coefficient associated to this variable is negative in each of the different regions. And yet, an increase in the price of medication is associated with a decrease of recourse to the various types of practitioner. The findings vary from one region to another.

As regards to the national level, recourse to a traditional healer declines by 8.44% when the price of medication increases by 1%. Furthermore, we notice that the response of recourse to a traditional healer owing to a unit price of traditional medication change is estimated at -13.76 for Abidjan, -3.25 for Other Cities, -18.02 for the East Rural Forest and -67.01 for the Rural Savannah.

Regarding recourse to modern health personnel, apart from the Rural Savannah region where the price elasticity of demand for public health facilities is high (about -47.50) and for Other Cities where it is very low (estimated at about -0.0015); on average, it's about -4 for Abidjan, the East Rural Forest region and for the estimation of the whole country.

Moreover, it can be observed that the coefficients associated with the variable price 2 are significant and positive for all the regions whatever the type of recourse. The elasticities associated with this variable for the two alternatives of medical care in comparison to self-medication are also positive. They remain very high by and large for the choice of the choice of a traditional provider, and especially for the case of Rural Savannah.

A likely explanation for this fact, regarding especially recourse to public health care, lies in the fact that most of the time there is a shortage of generic medicines at public health centres (MSSP, 2000) so that modern public doctor will find themselves obliged to prescribe special medicines that are more expensive than the generic ones. Accordingly, patients are obliged to buy them in so far as those special medicines are the sole for their recovery. In addition, it is worth highlitghting that some diseases which can not be cured by traditional healers require the service of modern healer (a surgery for example). In this case, the patient must buy the medications though it is more expensive. This would explain the fact that the more the prices of modern medications, the more the patients will turn to public health care.

Time to provider (time to get a health care practitioner)

This variable is a proxy of the distance to a medical service provider. The time to provider is an important determinant of modern health care use. Except for the Rural

Savannah region, all the coefficients assigned to this variable are significantly negative. In this region, the coefficient is significantly positive, but the marginal effects are not significant. This is also the case for Other Cities, but the coefficient of the time to provider is significantly negative.

The marginal effects at the means for this variable show that use of less than one hour to reach modern health facilities is associated with a 0.23 reduction in the probability of resorting to public health provider in Abidjan, a 0.073 reduction at the national level, and a 0.1 reduction in the East Rural Forest region. The structure of the findings for this variable may be due to the fact that the database was meant to measure the degree of people's poverty rather than capturing the performance of the health system. As such, the survey was related to very poor households; whom, despite living in Abidjan at the close proximity of the best equipped public health centres of the country, would be little inclined to go to these facilities for medical treatment even if it requires less than one hour to reach them. Besides, it raises from the analysis of the estimated parameters that if the time to reach a medical service provider is long, the patient does not resort to it. Not only is this observation in line with the hypotheses of the current study, it is also the outcome of the studies of Gertler et al., (1988) and Weil et al. (2003) on Côte d'Ivoire.

Among the difficulties related to the use of modern health care facilities in Côte d'Ivoire, there exists the remoteness of health centres. Moreover, it is important to stress that taking less than one hour to reach a traditional healer is not significant for any of the regions. In sum, it results from the analysis that when the public health care provider is located far away, the patient chooses self-medication.

Dummy variables for regions

Five dummy variables are used to represent regional disparities. The variable West Rural Forest is used as the reference. The estimations of the study show that only the regions of Abidjan and Other Cities determine recourse to a modern public provider.

7. Conclusions and recommendations

The issue addressed by the analysis of health care utilization in Côte d'Ivoire has given rise to the realization of the current study which relates to the various regions. The estimation results are in line with those of the previous empirical surveys on the characteristics of the household head and the household. These findings may be useful for the planners in the conception of health policies to be implemented in the different health sectors of each region of the country.

The results of the multinomial logit model highlight the importance of education level, income, the time to provider and the price of medication as relevant explanatory variables in the analysis of health care demand in Côte d'Ivoire. The household size, gender, age, religion and ethnic group also affect recourse to a health practitioner. It raises from these findings several perspectives for health policy for the different regions of the country.

Regarding the region of Abidjan, the government should set up policies that are likely to sensitize the population on the importance of seeking medical care from the national hospitals in the event of serious illness. In addition, it must improve the supply of the first-level health centres with necessary generic medicines to give first aid. Such a policy would reduce the cost of medicines, and consequently would lead to an increase of the visit rates of health establishments.

Moreover, the government should also work to set up a programme aimed at sensitizing the population on the need to adopt family planning schemes that would lead to a reduction of the household size. By working so, both government and planners would reduce the rate of self-medication as our results show that when the size of household is too high population recourse to traditional provider or to self-medication. Furthermore, poverty reduction should also be among the government's priorities. The cost recovery policy initiated by the government should be enhanced in favour of the poor populations of Abidjan.

The policies developed for the regions of Rural Savannah and "Other Cities" should mirror those of Abidjan. However, there are specificities related to education and geographic accessibility (time to provider) that are worth noting. As far as health education is concerned, public authorities ought to focus on policies aimed at sensitizing population on the importance of modern medicine in order to eradicate diseases such as poliomyelitis, diarrhoea, tuberculosis, etc.

In the particular case of Rural Savannah region, vaccination activities must be initiated so as to enable population to get medical treatment at a lower cost. Setting up such programmes aims at solving problems related to the remoteness of health

centres. In this region, both government and planners should envisage, through the decentralization programme, the construction of health centres at the close proximity of population. As such, people would therefore be more inclined to seek modern health care. This last policy option concerns the Rural East Forest region. Here, policies aimed at reducing poverty, increasing the income of the household head and reducing the price of medication will be beneficial for this region. Increasingly, the number of household head who resorts to traditional medicine is becoming significant. In this respect, government and planners should promote and regulate traditional medicine in the different regions of Côte d'Ivoire.

Despite the relevance of the findings, the study has its weaknesses, which partly have to do with the nature of the data. As a matter of fact, the data used were generated in 1993 and could be biased in the sense that may not reveal the current reality. Moreover, doing a survey on health care utilization in 2006 with data of 1993 may conceal the reality. It is also important to note that basing the analysis on a sample of people who declare themselves ill might be another source of bias. The ideal would have been to use the 2002 data, but they do not contain information relating to certain key variables of the study. In addition, the database of 1993 did not contain the variable distance to provider and the proxy for this variable (time to provider) did not really account for the remoteness of health centres.

Belonging to certain ethnic groups, like being Krou or Foreigner, was found to have a significant impact on the seeking of modern health care. Being Mandé or Voltaic, for their part, contributed to the choice of traditional medicine. Only membership in the Akan ethnic group affects both types of health care provider. However, the reason for this is beyond the capacity of this study. The search for this information may constitute a starting point for further research on health care demand in Côte d'Ivoire.

Notes

1. The five districts are Adzopé, Aboisso, Dimbokro, Abengourou and Gagnoa.

2. They are: Bouna, Bouaké, Daloa, Danané, M'bahiakro, Sassandra, Tabou and Soubré.

3. MSSP: Ministère délégué auprès du ministère de la solidarité chargé de la santé (Junior Ministry in charge of Health under the Ministry of Solidarity).

4. MSP = Ministère de la Santé Publique (Ministry of Public Health).

5. Health care provider means doctors, nurses and midwives at once.

6. Near the Equator, between the third and ninth degree of longitude west.

7. The rate until May 2002 (INS, 2004).

8. Ministère délégué auprès du Premier ministre chargé de l'Économie, des Finances et du Plan (Ministry in the Office of the Prime Minister in charge of the Economy, Finance and Planning).

9. Centre of Prospective Studies and Applied on Social Policies and Social Security Systems.

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Appendix

Model results

Note: In all five Appendix tables, the marginal effects concerning the variables Price, Price 2, Income, Income 2, Size and Size 2 are elasticities.

Table 7: Results for the whole country

Variables	Traditional Provider		Modern Provider	
	Coefficients	Marginal effects	Coefficients	Marginal effects
Price	-0.0121 (0.000)***	-8.4442 (0.000)***	-0.0071 (0.000)***	-4.4114 (0.000)***
Price 2	7.20e-06 (0.000)***	4.7695 (0.000)***	4.75e-06 (0.000)***	2.8486 (0.000)***
Income	8.10e-06 (0.168)	1.1421 (0.225)	5.26e-06 (0.068)*	0.6688 (0.082)*
Income 2	-1.48¬e-11 (0.309)	-1.4609 (0.350)	-6.85e-12 (0.203)	-0.1800 (0.339)
Household size	- 0.0974 (0.380)	-0.4500 (0.466)	-0.0871 (0.162)	0.3903 (0.176)
Size 2	0.0028 (0.720)	0.1556 (0.642)	-0.0039 (0.415)	-0.1453 (0.400)
Education				
Primary	-0.2732 (0.497)	-0.0083 (0.330)	0.3201 (0.075)*	0.0551 (0.083)*
Secondary	0.3764 (0.345)	0.0084 (0.512)	0.4217 (0.023)*	0.0691 (0.039)*
Higher	0.6503 (0.298)	0.0147 (0.543)	0.7758 (0.008)**	0.1408 (0.025)*
Religion				
Muslim	-0.0563 (0.889)	-0.0014 (0.894)	-0.0185 (0.925)	-0.0025 (0.032)
Christian	0.5253 (0.109)	0.0132 (0.184)	0.3338 (0.043)*	0.0504 (0.060)*

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Table 7 Continued

Variables	Traditional Provider		Modern Provider	
	Coefficients	Marginal effects	Coefficients	Marginal effects
Age				
18 to 35 years	-0.4192	-0.0080	-0.5351	-0.0741
	(0.236)	(0.312)	(0.001)***	(0.000)***
Old (more than 60 yrs)	-0.1903	0.005	0.0033	0.0015
	(0.543)	(0.521)	(0.983)	(0.950)
Ethnic group				
Krou	-0.1900	-0.0060	0.2257	0.0382
	(0.697)	(0.589)	(0.369)	(0.375)
Mandé	-0.9743	-0.1982	-0.1402	-0.0175
	(0.044)**	(0.010)*	(0.532)	(0.603)
Akan	-0.3507	-0.0090	-0.0255	-0.0021
	(0.404)	(0.386)	(0.909)	(0.950)
Foreigner	-0.6414	-0.0139	-0.3188	-0.0446
	(0.141)	(0.127)	(0.146)	(0.149)
Time taken				
Less than 1 hour	0.1928	0.0072	-0.4262	-0.0738
	(0.602)	(0.386)	(0.020)*	(0.027)*
Gender				
Male	0.5320	0.0123	0.0783	0.0096
	(0.108)	(0.069)*	(0.592)	(0.664)
Region				
Abidjan	0.5833	0.0008	1.9039	0.3818
	(0.297)	(0.949)	(0.000)***	(0.000)***
Other Cities	0.2080	-0.0040	1.5053	0.2617
	(0.673)	(0.741)	(0.000)***	(0.000)***
Rural East Forest	-0.0532	-0.0037	0.4020	0.0679
	(0.923)	(0.786)	(0.165)	(0.189)
Rural Savannah	0.9568	0.0387	-1.1906	-0.0252
	(0.077)*	(0.184)	(0.726)	(0.602)
Number of observations = 2142		Wald chi2(46)= 2318.65		
Log likelihood = -1193.9014		Prob>ch2 =0.0000		
Test of : chi2(20) = -707.11 chi2<0				

***significant at 1%; ** significant at 5%; * significant at 10%.

Table 8: Results for Abidjan

Variables	Traditional Provider		Modern Provider	
	Coefficients	Marginal effects	Coefficients	Marginal effects
Price	-0.0201	-13.7662	-0.0102	-4.7868
	(0.021)**	(0.076)*	(0.000)***	(0.000)***

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Table 8 Continued

Variables	Traditional Provider		Modern Provider	
	Coefficients	Marginal effects	Coefficients	Marginal effects
Price 2	4.54e-06	1.6266	5.90e-06	2.9341
	(0.621)	(0.854)	(0.000)***	(0.000)***
Income	0.00004	0.0485	0.00006	8.1804
	(0.054)*	(0.492)*	(0.000)***	(0.000)***
Income 2	-8.28e-11	-1.5768	-1.2e-10	-3.0185
	(0.122)	(0.639)	(0.000)***	(0.000)***
Household size	-0.9163	-2.6037	-0.9909	3.0479
	(0.042)**	(0.036)**	(0.000)***	-(0.000)***
Size 2	0.0526	1.2962	0.0483	1.1081
	(0.078)*	(0.014)*	(0.000)***	(0.000)***
Education				
Primary	-0.6579	-0.0009	0.4704	0.1169
	(0.618)	(0.779)	(0.268)	(0.260)
Secondary	1.0924	0.0001	0.6181	0.1532
	(0.379)	(0.794)	(0.112)	(0.106)
Higher	2.5777	0.0006	1.1079	0.2604
	(0.118)	(0.775)	(0.041)**	(0.020)**
Religion				
Muslim	-1.0505	-0.00019	-0.2706	-0.0673
	(0.447)	(0.780)	(0.563)	(0.561)
Christian	1.2156	0.00011	-0.1704	-0.0426
	(0.350)	(0.782)	(0.681)	(0.680)
Age				
18 to 35 years	-1.9307	-0.00014	-1.2830	-0.3017
	(0.216)	(0.774)	(0.025)*	(0.012)**
35 to 60 years	0.074	2.59e-06	0.1150	0.0286
	(0.952)	(0.987)	(0.815)	(0.815)
Ethnic group				
Akan	5.1502	0.0032	0.2619	0.6364
	(0.014)*	(0.765)	(0.483)	(0.494)
Voltaic	5.0472	0.0193	-0.7381	-0.1822
	(0.043)*	(0.792)	(0.261)	(0.200)
Foreigner	3.0521	0.00012	-1.1621	-0.2798
	(0.148)	(0.771)	(0.005)***	(0.003)***
Time taken				
Less than 1 hour	-2.1103	0.0004	-0.9706	-0.2333
	(0.104)	(0.774)	(0.014)**	(0.008)**
Gender				
Male	0.8760	0.000006	0.6774	0.1655
	(0.900)	(0.791)	(0.035)**	(0.029)**

Number of observations = 396 Wald chi2 (36) =471.21
Log likelihood = -199.445 Prob >chi2 = 0.0000
Test of : chi2(15) = -29.06 chi2<0

***significant at 1%; ** significant at 5%; * significant at 10%.

Table 9: Results for the Other Cities

Variables	Traditional Provider		Modern Provider	
	Coefficients	Marginal effects	Coefficients	Marginal effects
Price	-0.0062	-3.2539	-0.0079	-0.0015
	(0.006)***	(0.066)*	(0.000)***	(0.000)***
Price 2	4.56e-06	2.5620	4.90e-06	9.25e-07
	(0.000)***	(0.005)**	(0.000)***	(0.000)***
Income	-7.45e-06	-1.8028	0.00001	2.37e-06
	(0.457)	(0.281)	(0.016)**	(0.013)**
Income 2	9.73e-12	0.4910	-1.60e-11	-3.16e-07
	(0.730)	(0.614)	(0.188)	(0.000)***
Household size	-0.0014	-0.8128	0.5295	0.1028
	(0.995)	(0.516)	(0.000)***	(0.000)***
Size 2	-0.0026	0.7135	-0.0521	-0.0101
	(0.864)	(0.273)	(0.000)***	(0.000)***
Education				
Illiterate	-0.3094	-0.0044	-0.3861	-0.0748
	(0.711)	(0.811)	(0.316)	(0.331)
Primary	-0.4604	-0.0091	0.1508	0.0324
	(0.615)	(0.505)	(0.721)	(0.705)
Secondary	-0.1153	-0.0021	-0.0524	-0.0094
	(0.886)	(0.894)	(0.897)	(0.902)
Religion				
Muslim	-0.5345	-0.0151	0.5338	0.1051
	(0.471)	(0.382)	(0.102)	(0.084)*
Christian	0.6189	0.0108	0.5350	0.1041
	(0.319)	(0.491)	(0.061)*	(0.079)*
Age				
35 to 60 yrs	-0.0763	-0.0005	0.3752	0.0718
	(0.892)	(0.966)	(0.113)	(0.108)
Old (more than 60 yrs)	-0.7383	-0.0148	0.3335	0.0711
	(0.374)	(0.226)	(0.257)	(0.246)
Ethnic group				
Akan	0.2980	0.0055	0.1885	0.0354
	(0.714)	(0.772)	(0.550)	(0.574)
Krou	1.1853	0.0257	0.9465	0.1967
	(0.183)	(0.474)	(0.014)**	(0.031)*
Voltaic	1.0725	0.0375	-0.1809	-0.0427
	(0.162)	(0.304)	(0.586)	(0.463)
Foreigner	0.3843	0.0105	-0.2442	-0.0485
	(0.594)	(0.565)	(0.328)	(0.287)
Time taken				
Less than 1 hour				
	-1.7210	-0.0535	-1.0796	-0.2175
	(0.175)	(0.530)	(0.092)*	(0.162)

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Table 9 Continued

Variables	Traditional Provider		Modern Provider	
	Coefficients	Marginal effects	Coefficients	Marginal effects
Gender				
Male	0.6951	0.0137	-0.2894	-0.0618
	(0.280)	(0.148)	(0.182)	(0.168)
Number of observations = 785		Wald chi2 (38) = 751.11		
Log likelihood = -486.8578		Prob > chi2 = 0.0000		
Test of : chi2(18) = 14.64 chi2= 0.5509				

***significant at 1%; ** significant at 5%; * significant at 10%.

Table 10: Results for the East Rural t Forest

Variables	Traditional Provider		Modern Provider	
	Coefficients	Marginal effects	Coefficients	Marginal effects
Price	-0.0213	-18.0224	-0.0054	-3.9523
	(0.001)***	(0.001)***	(0.075)*	(0.079)*
Price 2	0.000014	9.9203	5.85e-06	3.8526
	(0.000)***	(0.000)***	(0.000)***	(0.000)***
Income	-0.00005	-7.9478	-0.00003	-4.4731
	(0.007)***	(0.010)***	(0.004)***	(0.004)***
Income 2	1.17e-10	3.3032	6.50e-11	1.7836
	(0.017)**	(0.021)**	(0.013)**	(0.015)**
Household size	0.0599	0.2542	0.3435	2.1975
	(0.917)	(0.948)	(0.221)	(0.223)
Size 2	-0.0190	-0.9399	-0.0376	-1.9972
	(0.627)	(0.672)	(0.099)*	(0.103)
Education				
Illiterate	0.2998	0.0008	-0.4898	-0.0334
	(0.809)	(0.771)	(0.375)	(0.413)
Secondary	1.2623	0.0062	0.3162	0.0212
	(0.439)	(0.644)	(0.655)	(0.696)
Religion				
Muslim	1.1109	0.0046	-0.4490	-0.0252
	(0.467)	(0.636)	(0.526)	(0.474)
Christian	0.7269	0.0020	0.2467	0.0149
	(0.545)	(0.618)	(0.627)	(0.630)
Age				
35 to 60 years	2.5083	0.0095	0.2959	0.0176
	(0.271)	(0.473)	(0.597)	(0.611)
Old (more than 60 years)	3.6079	0.0263	0.6253	0.0394
	(0.132)	(0.496)	(0.344)	(0.400)

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Table 10 Continued

Variables	Traditional Provider		Modern Provider	
	Coefficients	Marginal effects	Coefficients	Marginal effects
Ethnic group				
Akan	0.3698	0.0008	0.7486	0.0431
	(0.786)	(0.811)	(0.229)	(0.215)
Foreigner	0.0338	-0.0004	1.8539	0.1869
	(0.980)	(0.885)	(0.012)**	(0.081)*
Time taken				
Less than 1 hour	2.7546	0.0052	-1.1317	-0.0927
	(0.250)	(0.254)	(0.007)***	(0.028)**
Gender				
Male	2.4355	0.0038	0.1189	0.0068
	(0.213)	(0.331)	(0.836)	(0.837)
Number of observations = 432		Wald chi2 (32) = 691.17		
Log likelihood = -129.01597		Prob > chi2 = 0.0000		
Test of : chi2 (13) = -9.00 chi2< 0				

***significant at 1%; ** significant at 5%; * significant at 10%.

Table 11: Results for the Rural Savannah

Variables	Traditional Provider		Modern Provider	
	Coefficients	Marginal effects	Coefficients	Marginal effects
Price	-0.0738	-67.1005	-0.0523	-47.5079
	(0.000)***	(0.000)***	(0.000)***	(0.099)*
Price 2	0.00003	34.0712	0.00002	26.1937
	(0.000)***	(0.000)***	(0.000)***	(0.0701)*
Income	0.00004	4.7660	0.00007	8.6022
	(0.124)	(0.127)	(0.004)***	(0.004)***
Income 2	-0.00001	-2.6099	-0.00003	-6.5845
	(0.086)*	(0.090)*	(0.001)***	(0.001)***
Household size	0.2527	1.2318	1.1530	5.7269
	(0.720)	(0.726)	(0.056)*	(0.058)*
Size 2	-0.0616	-2.2256	-0.1197	-4.3446
	(0.413)	(0.418)	(0.062)*	(0.064)*
Education				
Illiterate	20.1826	0.00027	8.4149	0.0101
	(0.001)***	(0.089)*	(0.029)**	(0.899)
Primary	-20.2302	-0.00024	10.3591	0.9848
	(0.980)	(0.552)	(0.011)**	(0.000)***
Religion				
Other religions	-0.9736	-0.00005	2.8274	0.01978
	(0.378)	(0.632)	(0.009)**	(0.089)*

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Table 11 Continued

Variables	Traditional Provider		Modern Provider	
	Coefficients	Marginal effects	Coefficients	Marginal effects
Christian	-1.2197	-0.00004	3.2526	0.0781
	(0.659)	(0.678)	(0.027)**	(0.381)
Age				
35 to 60 years	3.5297	0.0003	2.2934	0.0165
	(0.175)	(0.759)	(0.129)	(0.564)
Old (more than 60 years)	2.4710	0.0002	3.0630	0.0285
	(0.354)	(0.753)	(0.051)	(0.087)*
Ethnic group				
Akan	-2.6740	-0.00013	-2.6829	0.0128
	(0.180)	(0.782)	(0.050)**	(0.082)*
Voltaic	-2.3674	-0.00012	0.8268	-0.0043
	(0.105)	(0.689)	(0.399)	(0.182)
Foreigner	-3.1714	-0.00006	0.8842	0.0070
	(0.121)	(0.528)	(0.592)	(0.417)
Time taken				
Less than 1 hour	2.1064	0.00008	1.4265	0.0059
	(0.140)	(0.413)	(0.023)*	(0.564)
Gender				
Male	5.0181	0.0002	0.4529	0.0021
	(0.013)**	(0.065)*	(0.611)	(0.659)
Number of observations = 275		Wald chi2(34) = 489.30		
Log likelihood = -57.467187		Prob > chi2 = 0.0000		
Test of : chi2 (13) = -0.43 chi2<0				

***significant at 1%; ** significant at 5%; * significant at 10%.

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