PART II

METHODOLOGY

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Chapter 3

ANALYTICAL FRAMEWORK OF FAMILY ABILITY TO PAY FOR HEALTH CARE

Section 3.1 - Theoretical framework : evidence from the literature

In health economics, the theoretical framework for studying empirically a family priority setting and decision-making in resources allocation for health care is not well established and is a part of the structure of this study that needs to be presented explicitly. This section describes briefly the theoretical framework as a method of highlighting key concepts which are used in this study. Previous findings on ability to pay for health care are examined in two stages :

(1) Family resources : entitlements and coping strategies;

(2) family coping strategies and responses to the increasing health care expenditures.

3.1.1- Family resources : entitlements and coping strategies

When faced with a sudden contingency like ill heath and medical costs, the health care expenditures incurred the family will depend on :

- The general perception of the illness and the cost of treatment needed;
- The demographic distribution of the illness such as the number of cases among children and women;
- The various resources available to the family;

- The responses it adopts - the way it mobilizes these resources.

The general perception of the illness is critical to health care expenditures. Acute malaria may impose sudden costs on the family which require sudden resources mobilization, because malaria is a curable disease.

The demographic distribution of the illness within the family is an important components in analyzing the health care expenditures. Intrafamily obstacles to health inputs may arise from patterns of allocation of resources for food, education, and the financial means to access medical care services. Families with many children under five years may be less able to commit resources for the health care of their members, with the result that costs of using health services (including user fees, travel expenses, and opportunity costs of the patient's and family care taker's time) often present a greater barrier for seeking professional treatment of malaria.

The various resources available to the family are important for judging its ability to pay for health care cots. In fact, cash income is not the only determinant of ability to pay for health care, and is not the only resource available to families. Potential resources might include cash savings, valuable assets and stores, disposal budget for human capital investments, family's disposal budget for consumption in other essential needs, and claims on government provision and social networks. A framework to examine family resource mobilization, which addresses the question of assets sales and threats to future livelihood, can be drawn from studies which examined family

capacity to cope with contingencies, namely famine. The key conceptual tools in this framework are 'entitlements' and 'coping strategies'(Russell, 1996). The entitlement set of a family is primarily determined by the following entitlements(Sen 1981, quoted in Russell 1996) :

- Its assets or initial ownership bundle : normally labour and land.
- With its assets the family can command direct entitlements through own production of crops or livestock in the case of exchange with nature.
- Labour, land and cash crops can be exchanged for money, which can then be used to purchase health care. These are called exchange entitlements. An illustrative example is that a family sells its labour and purchase essential health care with wages/cash income.
- Common property rights : this is measure of rights to common land for grazing, foraging and foods.
- Government provision of essential health services, social security or welfare or insurance prepayment : these can form an important component of the family's entitlement set, possibility threatened by government budget subsidies, financing reforms such as user fees, exemptions and general public health insurance scheme.
- Extended entitlements : they are part of broader social relations which make certain claims legitimate but not enforceable by law. The intra-family resources transfers in times of financial crisis may be legitimate through moral economy or kinship relations : '... such socially sanctioned rights may be extremely important in determining the amount of health care expenditure that different members of a family get...'(Dreze and Sen, 1989).

This desegregation of family resources is central to an analysis of family ability to pay for health care expenditures since it highlights the different resources and potential strategies available to an individual family.

3.1.2 – Family coping strategies and responses to the increasing health care expenditures

Coping strategies are employed once the family needs to mobilize non-routine resources to pay for necessary medical treatment. The ways to mobilize resources to cope with financial contingencies, is an important factor influencing ability to pay for health care expenditures. The understanding of such coping strategies and responses has been developed through work which examined vulnerability to famine(Chambers 1990; Swift 1988), and a few studies which have used family surveys to generate information on family cash availability and different ways families mobilize resources(Fabricant 1992; Mcpake et al, 1992; Russell 1996; Wallman and Backer 1996).

The desegregation of assets into investments, stores and claims combined with the typology of strategies and responses a family adopts when payment difficulties arise, improves understanding of the potential to mobilize resources to pay for health care expenditures in the short term (Table 2)

Table 5 : Family's asset categories and sources of money for health care expenditure

Asset categories	Payment difficulties arise : current strategies & responses(Sources of money)
Investments : - Human capital investment : education, health, nutrition - Individual productive assets : labour, land, livestock, farm equipment, etc. -Collective assets :common property right	- Forego investments in education and health prevention by reducing its budgets - Forego consumption of foods - Routine wages or salary income - Sell valuable assets
Stores : - Surplus farm produce or food stores : foods and non-food crops - Valuables/Possessions : jewelry... etc. - Savings	- Sell cash crops - Sell valuables and possessions - Use savings
Claims : - Claims on government health services: Subsidy, user fees exemptions - Claims on insurance(if insured) : co- payment - Claims on other families : neighbours, friends, - Claims within family : Discrimination	- Seek user fees exemptions - Seek insurance co-payment(if so) - Borrow cash or make claims on kin - bigging or charity - Only treat priority individual

Source : *Adapted from Wallman 1996; de Wall 1988; Steven Russell 1996; Swift 1988.*

Concepts are the building blocks of theory and a theoretical framework is one way a researcher organizes and makes sense of variables (Attig and Pattanee, 1993). Entitlement theory and coping strategies form the building blocks of an empirical analysis of ability to pay in the short and long run. Their strengths include the systematic classification of tangible and intangible resources available to families, and consideration of the longer term opportunity costs of foregone investments and productive asset depletion. The concepts of entitlement and coping strategies also allow a link to be made between family ability to pay and wider socio-economic and cultural contexts in Cameroon, for example, reduction of a

family's entitlement set and ability to pay due to macroeconomic recession with rising food prices, rising fees for health and education; falling real wages and unemployment (Abel-smith and Rawal, 1992).

3.1.3 – Some current policy criteria for fee exemptions

A closer look at existing exemption practices in Africa raises questions of rationale and fairness. In Lesotho, for example, relatively strict criteria have been used to distinguish between the poor and the nonpoor. Exemptions are awarded only to families with no income and no land, livestock, or other assets and belongings. These families must be certified by the village chiefs and district officers as 'paupers' (only about 200 families have received this certification)(Shaw and Griffin, 1995). This low figure suggests that other hardship cases, such as members of poor families headed by women, cannot afford to pay for health care, and might be denied treatment.

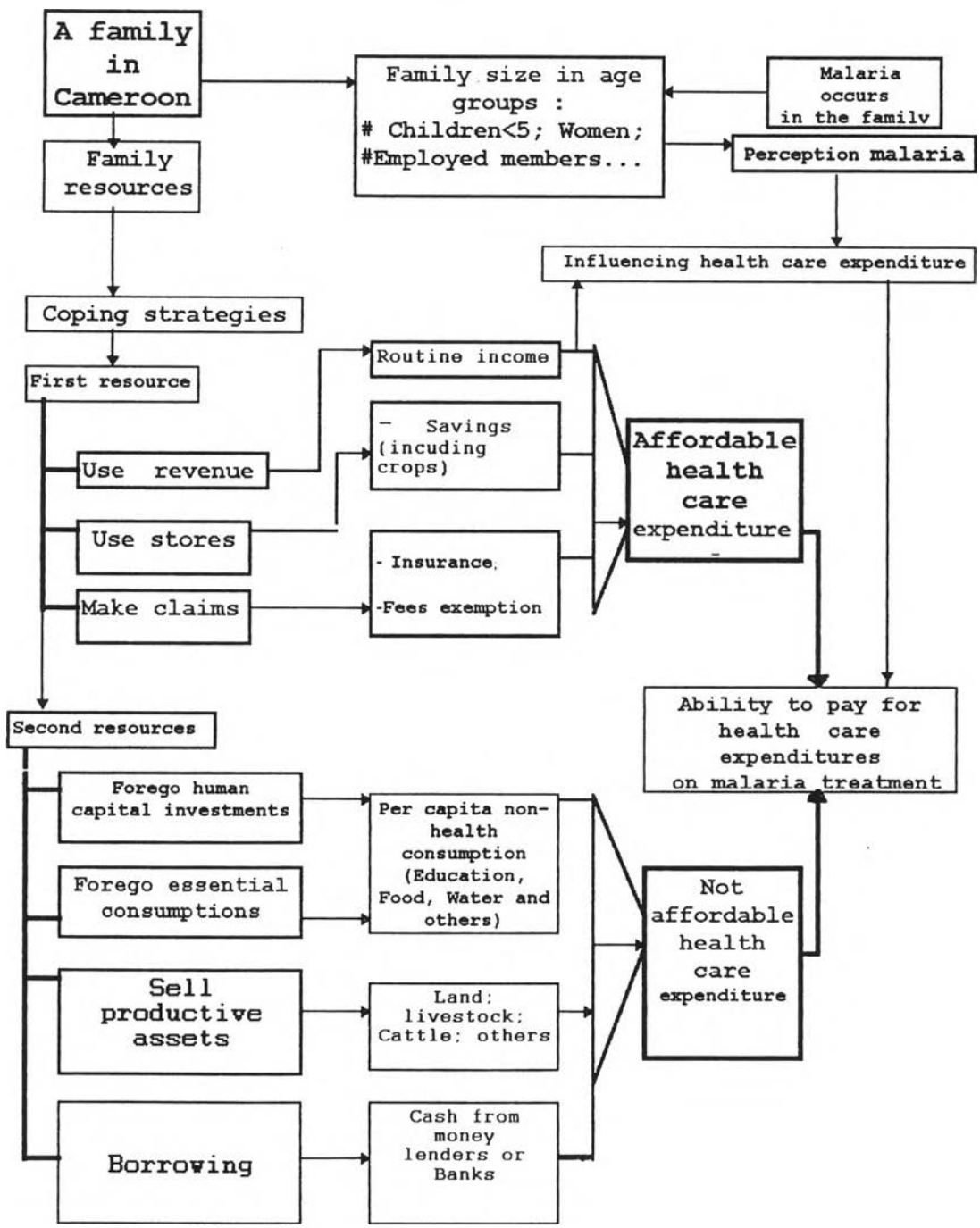
In Malawi, low-income exemptions are part of a user fees program. The ''core poor'' are to be exempt from fees, and the government is examining the landholding structure to identify those who qualify. The core poor, defined as families farming less than 0.5 hectare, comprise an estimated 500,000 families, or about 19% of all families in Malawi (Ferster et al, 1991). In areas where these families predominate, affordable fee schedules are being determined in collaboration with the communities.

Private voluntary hospitals and dispensaries in Tanzania report that up to half their patients may have some difficulty making full payments. Most facilities accept alternative forms of payments, including deferred payment, payment in kind with crops, or temporary employment (without pay). Ninety percent of hospitals and 20 percent of dispensaries exempt the disabled; 36 and 30 percent, respectively, exempt children under five ; and 23 and 5 percent, respectively, exempt people with chronic diseases (Mujinja and Mabala, 1992).

In Bolivia, about 50 percent of health facilities still provide free health care. Provision for fee waivers or fee

reductions for the poor are made by a hospital's social worker or by the institution. Criteria frequently used include income, size of family, per capita consumption and number of employed family members. The final evaluation and decision is subjective and strictly the responsibility of the individual (World Bank, 1989)

3.1.4 Conceptual framework : Figure 1



Source : Adapted from : Wallman and Baker 1996; Russell 1996

Section 3.2 - Analytical methods

3.2.1 - The Behavioral model : assumptions of the decision process when malaria occurs in the family

Behavior in medical markets is distinguished by the roles that physical and life-cycle patterns play in determining health care needs. Circumstances, such as malaria infection, often dominate health care consumption decisions in many Cameroonian families. But, according to the literature on the basis of both theoretical and conceptual frameworks, family ability to pay for health care expenditures on malaria treatment depends on various resources available to the family and the responses/ways it adopts to mobilize these resources, on some socio-demographic characteristics of the family, and the perception, on the frequency of malaria and the cost of treatment needed. The ability to pay for health care function is expressed as follows :

$$H_{\text{ability to pay}} = H_a = f(R,D);$$

where H_a is a vector of indicators representing the ability to pay for health care expenditures on malaria treatment by families; R is a composite vector of availability and accessibility to resources and the ways the family adopts to mobilize these resources, D is a composite vector of indicators for socio-demographic characteristics, malaria perception, frequency and cost of treatment incurred by family.

(R)Various resources available to family and the ways it adopts to mobilize these resources are measured by desegregation of family assets into the following categories : investments and consumption, stores, and claims. Each asset category contains variables generally used by families in the developing world as coping strategies to cope with health care expenditures. As regards to(D) it is measured by the socio-demographic characteristics of the family such as size of family, number of employed family members; malaria related factors such as

perception and frequency of malaria, and the total expenditures on its treatment incurred by a family.

This function is estimated using decision theory econometrics : a multinomial logit model on coping strategies:

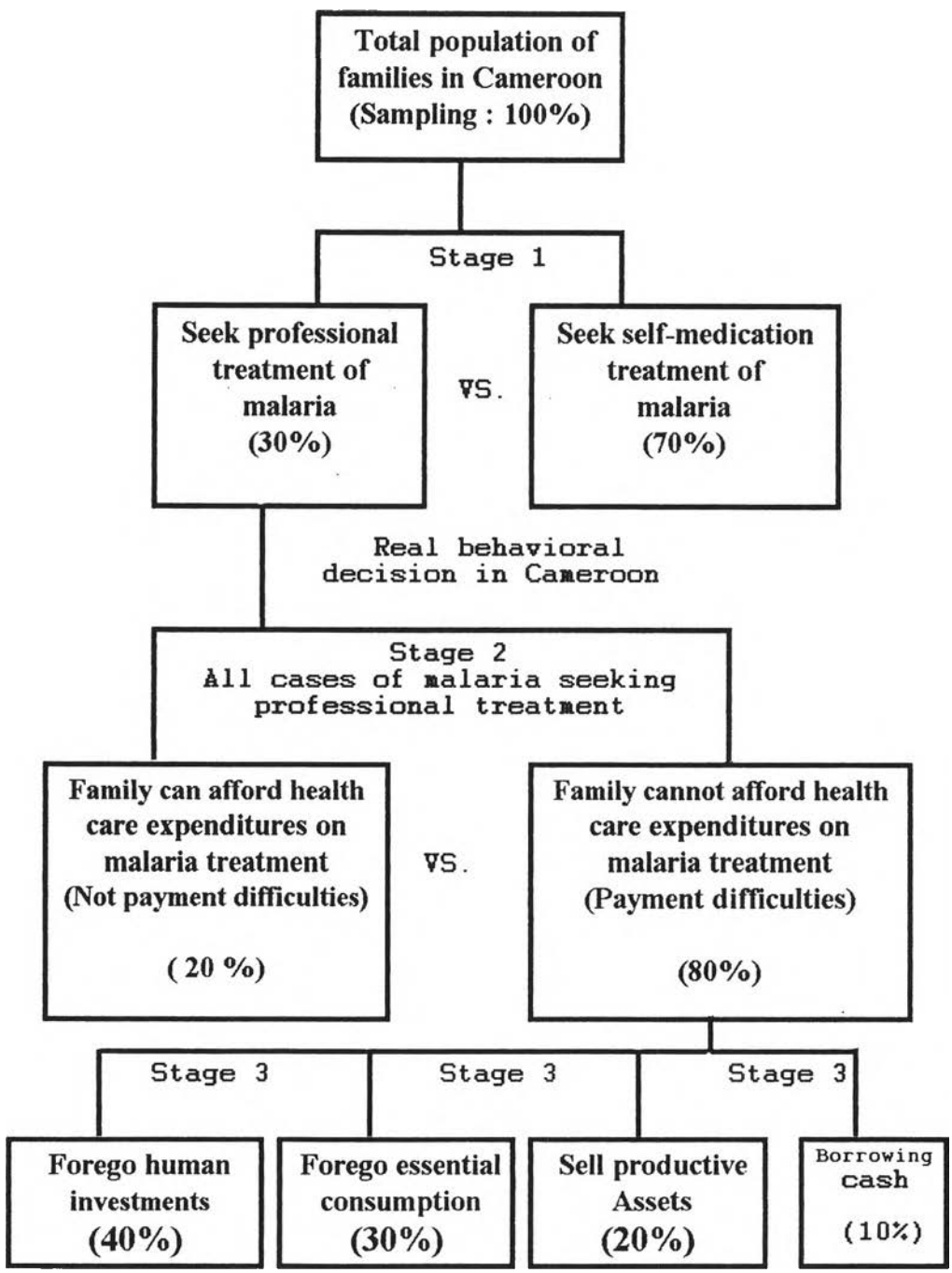
1 - The probability of seeking treatment vs not seeking treatment(self-medication);

2 - The probability of seeking treatment and being able to afford health care expenditures vs seeking treatment and being not able to afford health care expenditures;

3 - The probability of foregoing human capital investment (education); foregoing consumption of food and others; selling productive assets, when not able to afford health care expenditures on malaria treatment.

Figure 2

Assumptions of the decision process of families when experiencing malaria illness in Cameroon



3.2.2 - Multinomial logit model of family ability to pay for health care costs

The multinomial logit model is based on assumptions of decision process when malaria occurs in the family as discussed above. In an analysis of ability to pay, the starting point is a decision-making unit that, given limited resources and other constraints such as perception, frequency and medical costs of the illness, socio-demographic characteristics, tries to satisfy by priority its own health care needs. This unit is a ''Family'', but general theory can be well applied to an individual, a community, as well as to a hospital or a government. From both theoretical and conceptual frameworks, a family is assumed, when faced with sudden contingency like malaria and its medical costs, to decide not only whether to seek formal care for an ill member, but also where to find additional money, if it cannot afford to pay directly for the increasing health care expenditures. Coping strategies are emphasized to mobilize additional resources. Those resources usually come from sources given above.

Thus, we develop the family ability to pay model under the following assumption : '' If a malaria illness is experienced, a family has to decide not only whether to seek professional treatment, but also what type of coping strategies are to be used for mobilizing the health care expenditures needed'' (Figure 2). The benefit from seeking treatment is an expected satisfaction of the sudden health care needs. First, families are making a decision to choose from a finite set alternative strategies, one of which is '' not coping strategies at all'' : in this case we assume that a family makes a decision for self-medication of malaria or not to treat any more. Second, families can afford or cannot afford the health care expenditures, this is assessed from the patterns of mobilizing resources to pay for treatment.

McFadden (1973) suggested the conditional logit model and derived it from random satisfaction models. The McFadden model considers the effects of choice characteristics on the determinants of choice probabilities. We developed the multinomial logit model with the assumption that families as

consumers of medical care are rational in the sense that they adopt coping strategies that maximize their perceived satisfaction of health care needs subject to constraints on expenditures. The decision is made in order to maximize satisfaction of malaria treatment. Suppose the ith family has J+1 feasible coping strategies (with the $j=0$ coping strategies being not used). The satisfaction of choice j is :

$$(1)\ S_{ij} = \alpha' R_{ij} + \beta'_j D_i + \varepsilon_{ij}$$

Satisfaction of health care needs depends on R_{ij}, the observed attributes of the coping strategy j adopted and D_i the observed demographic and malaria characteristics factors related to family i. A disturbance term ε_{ij} captures unobserved variation in the decision process and in the attributes of alternative strategies, and errors in the perception and optimization by the family. If the family adopts strategy j, then S_{ij} must have been maximum among the $J+1$ satisfactions in order to be able to pay the amount of health care expenditures. Hence, the statistical model is driven by the probability that decision is made to adopt strategy j, which is :

$$(2)\ \text{Prob.}(S_{ij} > S_{ik}) \text{ for all other } k \neq j$$

3.2.3 - Empirical specifications of multinomial logit model of family ability to pay for health care costs

This model builds also on the studies done by Gertler and Van Der Gaag (1990) and William (1996). However their models are about the demand for medical care as a discrete choice. They employed a nested multinomial logit specification which allows non-equal cross-expenditure probabilities and has the multinomial logit as a special case. Further, they estimated the nested multinomial logit by full information maximum likelihood rather than the more popular two-step procedure. Finally, our model development owed more to the study done by Masako (1996), who developed the mixed or general model : a combination of

conditional logit model and multinomial logit model. Their models were estimated using data from the World Bank's Living Standards Measurement surveys with questionnaires in developing countries.

The model is made operational by choosing a distribution for the disturbances. Let H_{ai} be a random variable indicating the decision made to adopt a strategy. It takes on of the values 0,1,2,...J. McFadden (1973) has shown that if J+1 disturbances are independent and identically distributed with the type I extreme value distribution then :

(3) $\mathbf{Prob.}(\varepsilon_{ij} < a) = \mathbf{EXP}(-e^{-a})$,

$$(4)\ \mathbf{Prob.}(H_{ai} = j) = \frac{\mathbf{EXP}.(\alpha' R_{ij} + \beta'_j D_i)}{\sum_{j=0}^{J} \mathbf{EXP}(\alpha' R_{ij} + \beta'_j D_i)},$$

where $j = 0,1\ 2,\ldots,\ J$

This leads to what Greene (1993) and Masako (1996) called the mixed model (a combination of the conditional logit model and multinomial logit model) or what Maddala (1983) called the general model. Satisfaction of health care needs depends on R_{ij} (resources available and accessible to family and the ways it mobilizes these resources), D_i (socio-demographic characteristics, malaria perception, frequency and the expenditures needed for its treatment), the observed attributes of the coping strategy j adopted and used by family i. The attributes of R_{ij} which are resources available and accessible, and the ways these resources are mobilized vary with the strategy adopted and the family, while the socio-demographic characteristics, malaria perception, frequency and the expenditures needed for treatment (D_i) are the same for all strategies and vary only across families.

As already mentioned, in this study family resources are classified in three groups of attributes for each strategy j adopted and based on the following assets categories : human capital investment and consumption, stores, and claims. We

assume that each family knows which assets categories are available to them, and the expected monetary values for each individual attribute within the assets categories. Not every family will have access to all existing attributes of resources; for example, if family is not insured, it will not receive co-payment from insurance schemes. Socio-demographic attributes influencing family vulnerability are the following : principal sources of income, number of children under five, number of pregnant women, per capita consumption of non-health goods. Malaria attributes are : its frequency in the family, its perception by the family, family health care expenditures on malaria.

Vector α gives the vector of ''implicit contribution'' for different individual's attributes in the model. This coefficient gives the relative valuations of the different attributes for each strategy used. Also, given the attributes of a coping strategy, as chosen by a family, then the estimated coefficients can be used to predict the probability that this family will afford or not afford the health care expenditures on malaria treatment. Therefore, the probability of adopting a particular coping strategy can be predicted given a set of attributes : R_{ij}. The number of elements in vector α is the number of attributes plus the constant in the model, as well as the number of alpha parameters to be estimated. On the other hand, the number of elements in vector β_j is equal to the number of attributes in D_i.

With the estimated parameters and a family with specified attributes and characteristics, the probability that family will decide to adopt one of the coping strategies j can be predicted.

Let decision to adopt $j = 0$ be ''not coping strategies'', which means that family makes the decision to use the self-medication alternative, let decision to adopt 1 and 2 be both ''can afford or strategy 1'', and ''cannot afford or strategy 2 '', and let $R_{ij} = 0$. Therefore, the probability of adopting self-medication for malaria treatment with regards to family ability to pay is statistically expressed as follows :

$$(5)\ \mathbf{Prob.}(H_{ai} = 0) = \frac{1}{1 + \sum_{j=1}^{J} \mathbf{EXP}(\alpha' R_{ij} + \beta'_j D_i)},$$

where $j = 0, 1, 2, \ldots, J$.

And the ability to pay for adopting coping strategy j is :

$$(6)\ \mathbf{Prob.}(H_{ai} = j) = \frac{\mathbf{EXP}.(\alpha' R_{ij} + \beta'_j D_i)}{1 + \sum_{j=1}^{J} \mathbf{EXP}(\alpha' R_{ij} + \beta'_j D_i)},$$

where $j = 0, 1, 2, \ldots, J$

The Log likelihood for this problem is :

$$(7)\ \mathbf{InL}_i = \sum_{j=0}^{J} V_{ij}\ \mathbf{InProb}(H_{ai} = j)$$

Where V_{ij} is dichotomous variable that takes on the value 1 if family i decides to adopt alternative coping strategy j, i.e. if $H_{ai} = j$.

C - Multiple regression model of family health care costs on malaria treatment

The Multiple regression model is developed with regard to the epidemiological distribution of malaria in the Cameroonian families. Both direct and indirect costs are estimated as a proxy of family health care expenditures on malaria treatment. Factors influencing the health care expenditures on malaria treatment in the family are both age group and sex issues. Children under five and pregnant women are the most commonly infected groups. On the other hand, when malaria occurs in Cameroonian families, the money they spend often depends on the

general perception about malaria illness, the family's income, and the accessibility to subsidy and insurance. In this study, we use the multiple regression equation to estimate the dependent variable : family health care expenditures on malaria treatment from the following the independent variables : family perception of malaria; cash income; frequency or number of malaria cases respectively among children under five; pregnant women; and others members of the family; access to fee exemptions and insurance pre-payment.