PART III

ANALYSES

Chapter 5

RESULTS AND DISCUSSION

In this chapter the results are presented in the light of the magnitude of the ability to pay indicators. The analyses are structured as follows :

(1) Estimated coefficients and descriptive statistics.

(2) Policy simulations with both fee exemption and insurance variables.

Section 5.1 - Estimates and descriptive statistics

This section presents the results of both binomial and multinomial logit model analyses of the families decision process with regard to ability to pay for health care costs. The results of stage 1, stage 2 and stage 3 are presented separately in Tables 7 to 14.

In the first stage, families face two choices : seeking professional treatment and self-medication. The model is binomial logit and all the estimated coefficients in this stage are relative to self-treatment of malaria.

With regard to the second stage, families also face two possibilities : can afford and cannot afford health care costs. The binomial logit model is used to estimate the coefficients in relation to the possibility : ''family cannot afford health care costs''.

The third stage presents the maximum likelihood estimation results of the multinomial logit model for families which cannot afford health care costs. Families at this stage face at least four choices : foregoing education; foregoing food consumption; selling productive assets; and borrowing cash from money lenders or banks to pay for health care costs in the short-run.

The coefficients of the health care costs as proxy of expenditures on malaria treatment are estimated by multiple regression model. They are presented in Table 12 .

5.1.1 - Results Stage 1 : Binomial logit model : Professional treatment vs. self-treatment

Table 7 : Binomial logit stage 1 : results of seeking professional treatment vs. self-medication when considering the family ability to pay for health care expenditures on malaria treatment in Cameroon :

(seeking professional treatment =1, self-medication =0)*

Variable	Coefficient	Std. Error	T-Stat
Constant[a]	-1.2178	0.4625	-2.6321
Costs of malaria treatment	-0.0852	0.0503	-1.4436
Income[b]	0.0012	0.0515	1.4102
Savings[c]	0.0041	0.0079	0.8935
Fee exemptions[a]	0.0187	0.2563	1.0231
Insurance co-payment[a]	0.0504	0.0054	0.6741
Per capita consumption[c]	0.0370	0.0012	2.4568
Principal source Income (Farm=1, Otherwise=0)	-0.0063	0.0154	-4.0225
Own Land & Assets (Yes=1, No=0)	0.0090	0.1931	2.9974
Family size	0.0021	0.0172	1.0063
Number employed members[c]	0.0912	0.0039	0.8796
Number of children <5[b]	0.0071	0.0623	1.5854
Number of Pregnant Wom.[a]	0.0046	0.1729	3.8791
Frequency of Malaria[c]	0.1501	0.0018	0.4125
Perception (Serious=1,Not S=0)	0.0001	0.3701	2.5189
Sex head family[b]	0.0064	0.0067	1.0035
Residence(Rural=1,Ur=0)[a]	-0.0073	0.0191	-2.0017
Preventive Measures[c] (Yes=1, No=0)	-0.1025	0.0011	-1.1189
Log likelihood :	-621.4613		
Number of observations	500		
Percentage :			
Obs. with Dep=1 :	30%		
Obs. with Dep=0 :	70%		
Notes : Significance two-sided			
a. Significant at 10% level			
b. Significant at 5% level			
c. Significant at 1% level			

*Results generated with hypothetical data and processed from Eviews software program

Table 8 : Descriptive statistics - Binomial logit stage 1 : results of seeking professional treatment vs. self-medication when considering the family ability to pay for health care expenditures on malaria treatment in Cameroon :

(seeking professional treatment =1, self-medication =0)*

Variable	Mean All	Mean D=1	Mean D=0
Constant	1.0000	1.0000	1.0000
Costs of malaria treatment	6.2541	11.4255	5.0065
Income	38.0450	40.2653	30.7560
Savings	1.9023	3.0285	1.4875
Fee exemptions	0.0250	0.5250	0.0000
Insurance co-payment	1.5635	2.8625	0.0000
Per capita consumption	6.7125	5.2587	6.0026
Principal source income (Farm=1, Otherwise=0)	0.3524	0.5265	0.3003
Own Land & Assets (Yes=1, No=0)	0.0625	0.2475	0.2625
Family size	6.0110	8.5001	5.0100
Number employed members	2.7500	2.0025	2.0795
Number of children <5	2.0450	4.1253	2.0015
Number of Pregnant Wom.	0.4512	2.0252	1.0485
Frequency of Malaria	0.0784	0.4012	0.0530
Perception (Serious=1,Not S=0)	0.3950	0.8950	0.0145
Sex head family	0.0182	0.5124	0.0957
Residence(Rural=1,Ur=0)	0.2549	0.5125	0.4575
Preventive Measures (Yes=1, No=0)	0.5512	0.3510	0.6215
Number of Observations	500		
Percentage :			
Obs. with Dep=1 :	30%		
Obs. with Dep=0 :	70%		

*Results generated with hypothetical data and processed from Eviews software program

Maximum-likelihood estimation results of the binomial logit model for family's dicision to seek medical treatment of malaria are presented in Table 7. While Table 8 presents the descriptive statistics. Families face two choices :seeking professional treatment at health facilities and use self-medication. All the estimated coefficients are relative to self-care. As expected the estimated coefficients have the a priori expected signs and most are statistically significant at 10 percent or better level(i.e., less than 10 percent).

The findings emanating from an analysis of table 7 of the stage 1 are as follows :

(1.1) - Family's resources attributes in the first binomial logit model:

- The per capita consumption effect is positive and significantly different from zero at 1% level. It suggests that the log-odds in family's decision of seeking professional treatment of malaria increases of about 0.037 or 3.7% as an average annual per capita consumption rises by a unit, say CFAFranc 10,000. This coefficient is larger than the estimated coefficient of income. It is also more significant than the coefficient of income. The magnitude of this estimated coefficient is consistent with the ability to pay for health care rationale in developing countries.

- The income effect is positive and significantly different from zero at the 5% level. This result indicates that the higher the income, the greater the (log) odds of the family seeking professional treatment of malaria. The imminent explanation is that the professional treatment represents higher cost/higher quality of medical care in relation to self-medication. And in the discrete choice world, health being a normal good implies that as income rises families are more likely to choose the higher costs/higher quality options.

- The coefficient on savings is positive and significant (at 1% level), and is larger than for income. This suggests that savings have a greater impact on the family's ability to solve an acute problem prevalent among its members. This is consistent with economic theory from a motive to consume professional medical care as an investment in health.

- Both fee exemptions and insurance co-payment effect are positive and significant (at 10% level), and the estimated coefficients are smaller than expected. But the effect of fee exemption is larger than for insurance. There are four immediate explanations. The first is that exemption policy implies that the treatment of malaria is slightly free of charges at the point of service, since the insurance policy is a matter of some kind of cost-sharing between insured family and insurance

schemes at the health facilities. The second explanation is that in the absence of user fees, equal access to professional treatment of malaria is still not 100 percent assured in Cameroon. The indirect access costs, such as transportation fees, are important determinants of health care choices, and when direct medical costs are small, these indirect costs become the dominant rationing device because the majority of poor families inhabit rural areas and health infrastructures are concentrated in cities. With regard to fee exemption, the third explanation is that the effectiveness of this policy requires a good informational system. The poor families may not seek professional treatment if they don't know that the service is provided free of charge to them. Another explanation is that the coverage of both fee exemption and health insurance is set at the low level in the assumptions made to generate data, this may be too small or high vis-à-vis the real figure in Cameroon today.

- The effect of the ownership of land and/or other assets is positive, and is not significantly different from zero in the professional treatment equation. This result is consistent with the family's decision to seek professional treatment of malaria which may be influenced by some qualitative factors. More discussion about the magnitude of assets effect is presented in the next models.

(1.2) - Socio-demographic and health attributes in the first binomial logit model.

- The family demographic characteristics perform as expected. The size of the family has a positive effect, and is not significantly different from zero in the professional treatment equation. This result indicates that the number of people living in the family has a positive effect on the probability of seeking professional treatment, but the family might discriminate among its members and/or can only treat priority individuals when considering its ability to pay for health care. The estimated coefficient of the number of children under five years old is positively significant at the 5% level. The greater the number of children in the family the higher the probability of seeking professional treatment with malaria cases. The number of pregnant women in the family has also a positive effect on the probability of going to health facilities

for malaria treatment. The sex of head of the family has a positive effect significant at the 10% level. The family headed by a woman prefers to treat malaria at health facilities more than does the similar family headed by a man, everything being equal.

- The number of employed members effect is positive, and is significant (at the 1% level). This estimated coefficient implies that the log-odds in favor of the family's decision to seek professional treatment of malaria increases of about 0.0912 or 9.12% as one additional member of the family is employed in the labor market. This is consistent under the assumption made that each additional employed member in the family should work in the modern labor market which leads to a good additional standardized yearly income. This result should be slightly different if the variation of income by type of both activities and human capital has been taken into the hypothetical assumptions.

- The malaria frequency effect is positive and significantly different from zero at the 1% level. Its coefficient suggests that the log-odds in favor of seeking professional treatment increases of about 0.1501 or 15.01% as the malaria frequency increases by a unit, say, 0.01. This result is consistent with the family health seeking behavior in relation to self-medication in Cameroon. Many families seek professional treatment after more than one episode of malaria case due to the higher self-medication drug resistance. Since the self-care often relieves the illness only for few days, family joints the professional treatment at the second or n_{th} episode.

- The perception of malaria is positive, and is not significantly different from zero in the professional treatment equation. This result indicates that in the high endemicity districts, the perception of malaria by the family may not explain accurately the decision process to seek professional treatment.

- The preventive measures effect is negative and significantly different from zero at the 1% level. This estimated coefficient implies that the log-odds in favor of

seeking professional treatment of malaria decreases of about 0.1025 or 10.25% when the family introduces effectively the use of self-protection measures (e.g. impregnated bednets). This is consistent with the assumption made that the effective utilization of preventive measures reduces the frequency of malaria by about 50% in the family.

- The principal sources of income effect is negative, and is not significantly different from zero. Perhaps this is explained by the fact that the poor farmer's family is more likely to be better-off than the poor worker's family.

- The residence effect is negative and significantly different from zero at the 10% level. This result is consistent with the health seeking behaviour of the rural population which in Cameroon prefers both self-medication and traditional healer when they experience an illness.

- Costs of malaria treatment effect is negative. It is not significantly different from zero in the professional treatment equation. This implies that many families could delay or reduce professional treatment of malaria due to the health care costs. But further discussion about the magnitude of expenditures effect will be given in the next stages.

- The constant (intercept) effect is negative and significant at the 10% level. Its coefficient indicates that the log-odds in favor of seeking professional treatment decreases of about 1.2178 or 121.78% if all other attributes are zero. Like most interpretation of intercepts, this interpretation may not have any physical meaning.

The overall results of this first stage suggests that the binomial logit model estimated coefficients with income, savings, fee exemptions, insurance, land ownership, per capita consumption, family size, number of employed members in the family, number of children under five years old, number of pregnant women, frequency and perception of malaria, sex of head of the family are positive. This implies that the probability that families seek professional treatment of malaria from health facilities increases with any positive changes in each of those attributes. The positive changes here means that if for example,

family's income and/or savings increases; or if family has access to health insurance or can be exempted from user fees; then it is more likely to seek professional treatment of malaria at health facilities rather than it would decide otherwise to self-care. On the other hand, the coefficients associated with expenditures on malaria treatment, principal source of family's income, residence, preventive measure, and the constant are negative. The increase in malaria treatment costs, earning more income from the agriculture sector, and living in rural areas have negative effects on the family decision to seek professional treatment of malaria relative to self-medication.

5.1.2 - Results stage 2 : Binomial logit model : Affordable health care vs. not affordable health care

Table 9 : Binomial logit stage 2 : Results of affordable health care vs. not affordable health care on malaria treatment in Cameroon : (Can afford = 1, Cannot afford = 0)*

Variable	Coefficient	Std. Error	T-Stat
Constant[a]	-2.0429	0.0457	-3.4567
Costs of malaria treatment[a]	-0.0068	0.0125	-1.2358
Income[b]	0.0784	0.0027	4.0267
Savings[b]	0.0012	0.0013	3.0051
Fee exemptions[b]	0.0026	0.0059	0.2519
Insurance co-payment[c]	0.0519	0.0814	0.1478
Per capita consumption[c]	0.1248	0.0023	1.0374
Principal source income (Farm=1, Otherwise=0)	-0.0046	0.0235	-1.2635
Own Land & Assets (Yes=1)	0.0657	0.0122	1.3790
Family size	-0.0003	0.0197	-0.9707
Number employed members[c]	0.1810	0.0026	1.0879
Number of children <5[b]	-0.0082	0.0018	-0.0412
Number of Pregnant Wom.	-0.0047	0.0384	-3.8420
Frequency of Malaria[c]	-0.1106	0.0210	-0.9168
Sex head family[a]	-0.6211	0.0016	-1.6424
Residence(Rural=1,Ur=0)[a]	-0.0001	0.0564	-4.2152
Preventive Measures[c] (Yes=1)	0.0613	0.0091	1.8612
Log likelihood :	-181.9417		
Number of Observations	150		
Percentage			
Obs. with Dep=1 :	20%		
Obs. with Dep=0 :	80%		
Notes : Significance two-sided			
a. Significant at 10% level			
b. Significant at 5% level			
c. Significant at 1% level			

*Results generated with hypothetical data and processed from Eviews software program

Table 10 : Descriptive statistics - Binomial logit stage 2 : Results of affordable health care vs. not affordable health care on malaria treatment in Cameroon :

(Can afford = 1, Cannot afford = 0)*

Variable	Mean All	Mean D=1	Mean D=0
Constant	1.0000	1.0000	1.0000
Costs of malaria treatment	10.0254	12.0051	9.1255
Income	28.1456	39.6870	26.9675
Savings	2.4516	3.5012	2.7548
Fee exemptions	0.1545	0.6275	0.0000
Insurance co-payment	0.7565	0.1375	0.0000
Per capita consumption	4.5012	7.1547	3.9874
Principal source Income (Farm=1, Otherwise=0)	0.4256	0.4125	0.6753
Own Land & Assets (Yes=1, No=0)	0.4572	0.9255	0.0126
Family size	6.5796	5.8964	7.1250
Number employed members	2.0015	4.0036	2.0001
Number of children <5	3.0146	1.5237	3.7512
Number of Pregnant Wom.	0.5512	0.8513	1.9758
Frequency of Malaria	0.0857	0.0125	0.3549
Sex head family	0.1250	0.2157	0.3125
Residence(rural=1)	0.3457	0.2515	0.5426
Preventive Measures (Yes=1, No=0)	0.1254	0.4529	0.1854
Number of Observations	150		
Percentage :			
Obs. with Dep=1 :	20%		
Obs. with Dep=0 :	80%		

*Results generated with hypothetical data and processed from Eviews software program

Table 9 shows the maximum-likelihood estimation results of the binomial logit model of the affordability of malaria treatment costs at health facilities. While Table 10 presents the descriptive statistics. Families face two strategic options : seeking professional treatment and being able to afford health care expenditures vs. seeking professional treatment and being not able to afford health care expenditures. All the estimated coefficients are relative to be not able to afford health care costs at health facilities. The coefficients have the a priori expected signs and most are statistically significant at 10 percent or better level. the findings emanating from an analysis of this second are as follows :

(2.1) - Family's resources attributes :

Per capita consumption. The effect of this indicator is positive and significantly different from zero at the 1% level . The log-odds in favor of family's ability to pay increases of about 0.1248 or 12.48% as its per capita consumption rises by a unit, say, CFAFrancs 10,000. This suggests that wealthy families are more able to pay for health care costs. When on the other hand poor families are more vulnerable with the increasing health care expenditures, they use coping strategies by foregoing education and food consumption, selling their assets in order to satisfy the health care needs of their members.

Income. The effect of income is positive and significant (at the 5% level). With regard to ability to pay, high income families are much more likely to afford the medical costs in the presence of malaria illness than are the lowest income or poor families. Income also affects the family's decision to forego education and food consumption or to sell productive assets.

Savings. The level of both formal and informal savings (including crops) of the family has a positive effect on the probability to afford health care costs. its estimated coefficient is significant at the 5% level. This finding suggests that families having a high level of savings are more likely to afford health care costs.

Fee exemptions. For the lowest income or poor families, the accessibility to fee exemptions has a positive effect on the probability to afford health care costs. The coefficient is significant at the 5% level.

Insurance co-payment. Health insurance has a real positive effect on the probability for families to afford its medical costs. The estimated coefficient is positively significant at the 1% level. This implies that the log-odds in favor of the affordability of medical costs increases of about .0519 or 5.19% as family is covered with health insurance. Since the insurance pre-payment might improve more significantly the family's ability to pay for health care expenditures, there is no evidence that the poor family could afford the insurance premium in Cameroon. Therefore insurance schemes with high premiums

would of greater be benefit to nonpoor families than to poor families in Cameroon.

Productive assets (e.g. land). The ownership of land and other assets has a positive effect on the family's ability to pay for health care costs. Its estimated coefficient is not significantly different from zero in the affordability of health care equation. This is explained by the fact that the land ownership is measured as dummy variable which may not distinguish between the smaller and bigger owners.

(2.2) - Socio-demographic and health attributes :

Family size. The number of people living in the family has a negative effect on the family ability to pay for health care. The large families are likely less able to afford the malaria treatment costs in Cameroon. But the estimated coefficient is not significant. This indicates family size alone seems to be not sufficient to permit an accurate judgment about the family's ability to pay for health care. More information are needed on number of employed members, children, and elderly people in the family.

Number of employed members. The family's ability to pay might depend on the number of employed members. This indicator has a real positive effect on the probability of a family to afford health care costs.

Principal source of income. The effect is negative and the coefficient is not significant. Anyway, this implies that families whose income is earned mostly from Agriculture sector are likely to be less able to pay for the increasing health care expenditures on malaria treatment in Cameroon.

Residence. Most families living in rural areas seem to be generally less able to pay for health care than do urban families. But the coefficient is not significant, perhaps because within the same income group, rural families are better-off for paying health care costs comparing with urban families.

Sex of head of the family. Families headed by women appear to be less likely to be able to pay for health care costs than do families headed by men. Female head of the family has a negative effect on the probability of affording health care costs. The log-odds in favor of the probability of being not able to pay for health care expenditure increases of about 0.6211 or 62.11% if the family is headed by a woman. This result is consistent with poor women headed families' vulnerability in developing countries.

Number of children under five years old. Families with more children in this age groups are likely to seek professional treatment, but most of them cannot afford the health care costs. The children under five effect is negative and significant (at the 5% level).

Number of pregnant women. With more pregnant women in the families, the probability of seeking professional treatment of malaria increases. But those families are likely less able to afford the health care costs.

Malaria frequency. The number of malaria cases experienced in the family has a positive effect on the family's decision to seek professional treatment. But the lower probability of affording health care is associated with the higher frequency of malaria. The estimated coefficient is significant (at the 1% level). The log-odds of family being not able to pay for health care costs increases of about 0.1106 or 11.06% as frequency rises by a unit.

Preventive measures. The prevention strategies such as impregnated bed nets in the family has a significant positive effect on the family's ability to pay for health care costs. The preventive measures reduce the incidence of malaria in the family which indirectly lowers the financial burden of treatment. The coefficient is significant at the 1% level, and the log-odds in favor of family being able to pay for malaria treatment costs increases of about 0.0613 or 6.13% as preventive measures are effectively used in the family.

Costs of **malaria treatment**. The effect is negative and significantly different from zero at the 10% level. The log-odds

of family's ability to pay reduces of about 0.0068 or 0.68% as health care costs increase as a unit per year, say CFAFrancs 10,000.

In this stage, income, savings, fee exemptions, insurance, per capita consumption, land ownership, number of employed members in the family, and preventive measures have positive estimated coefficients. This sign also suggests that relative to ''unable to pay or cannot afford health care costs'', the increase in those variables is more likely to improve the family's ability to pay or the affordability of health care costs. For the family characteristics such as : size, number of children under five years old, number of pregnant women, sex of head of the family, principal source of income, and malaria frequency and its medical costs, the estimated coefficients are negative. An increase in those variables would have significant negative effects on the family ability to pay for health care costs.

Although these findings need to be confirmed with some homogeneous real data collected at the families level through the designed questionnaire here included in the appendix, a feature of these results is that they offer a powerful tool for identifying the determinants of family's ability to pay for health care expenditures in Cameroon. Such findings can be widely used as indicators of fee exemptions, and thereby constitute the empirical pillar upon which the analysis of family ability to pay for health care costs can be based in Cameroon.

5.1.3 - Results stage 3 : Multinomial logit model :

Stage 3.1 - <u>Forego education</u>

- Forgo education vs. forego food consumption and sell productive assets

Stage 3.2 - <u>Forego food consumption</u>

- Forego food consumption vs. forego education and sell productive assets

Stage 3.3 - Sell productive assets

- Sell productive assets vs. forgo Education and forego food consumption

Table 11 : Stage 3 : Multinomial logit estimated coefficients*

Variables	Stage 3.1 : Forego Education		Stage 3.2 : Forego Food Consumption		Stage 3.3 : Sell Productive Assets	
	Coeffi-cient	Std E.	Coeffi-cient	Std E.	Coeffi-cient	Std E.
Constant	-3.91[a]	0.9	-1.08[b]	0.0	-2.95[a]	0.2
Costs of malaria treatment	0.03[a]	0.0	0.15[a]	0.0	0.08[a]	0.4
Income	-0.09[a]	0.1	-0.09	0.3	-0.59[c]	0.0
Savings	-0.15[b]	0.1	-0.50[a]	0.1	-0.30[c]	0.8
Fee exemptions	-1.02	0.1	-0.71	0.6	-0.50	0.9
Insurance co-payment	-0.52[b]	0.5	-0.31	0.6	-0.89[a]	0.1
Per capita consumption	-0.54[c]	0.0	-0.10[c]	0.0	-0.07	0.0
Principal source incom (Farm=1, Otherwise=0)	0.21	1.1	0.32	0.1	0.31	0.1
Own Land & Assets (Yes=1, No=0)	-0.07	0.2	-0.10[b]	0.5	-0.13[c]	0.8
Family size	0.10	0.1	0.18[c]	0.0	0.06	0.1
Number employed member	-0.89[c]	0.1	-0.30[a]	0.2	-1.05[b]	0.0
Number of children <5	0.09[a]	0.6	0.11[b]	0.6	0.04	0.2
Number of Pregnant Wom	0.18	0.5	0.41[a]	0.8	0.07	0.3
Frequency of Malaria	0.51[c]	0.0	0.09[c]	0.0	0.17	0.0
Sex head family	0.08[a]	0.3	0.01[a]	0.1	0.35	0.1
Residence(Rural=1,U=0)	0.01	0.1	0.79	0.2	0.68[b]	0.1
Preventive Measures (Yes=1, No=0)	-1.01[c]	0.0	-0.07[c]	0.1	-3.67[a]	0.1
Notes:Significance two-sided a. Significant at 10% level b. Significant at 5% level c. Significant at 1% level						
Percentage Adopting	40%		30%		20%	

*Results generated with hypothetical data and processed from STATA software program

The maximum-likelihood estimation results of multinomial logit model are presented in Table 11 . Families face four coping strategies choices : forego education, cut food consumption, sell productive assets(e.g. land), and borrow cash from money lenders or banks. All estimated coefficients are relative to borrowing cash. The findings emanating from an analysis of Table 11 are presented in the subsequent analysis.

The interpretation of the signs of coefficients is analytically different in the sense that the negative sign is preferred to positive sign. But the meaning is the same as in the previous stages.

The income effect is negative. It is significant respectively at the 10% for foregoing education; at the 5% level for reducing food consumption; and is not significant for selling assets. Thus, income affects the family's decision to forego education and to cut food consumption more likely than it influences the decision to sell assets. This suggests that the lowest income families are more likely to cut food consumption and to withdraw their children from school than are the well-off families. This finding is consistent because most poor families don't own the land which has been used to represent assets in this study.

The per capita consumption effect is similar to income effect. But the magnitude of its estimated coefficient is higher than the income. For both forego education and food consumption, this coefficient is significant at the 1% level. This implies that poor families are more vulnerable to the combined user fees in various social sectors.

The savings effect is negative. The estimated coefficients are significantly different from zero for every coping strategy. This suggests that families having a low level of savings are more likely to sacrifice education, food, or sell land. This is consistent because savings were estimated from family's income.

The fee exemption effect is negative and significant at the 10% level. The exemption is likely to reduce the log-odds in favor of protecting education, food and assets for the poor families.

The insurance effect is similar but better than fee exemption. Families access to health insurance is more likely to reduce the probability of foregoing education and food consumption, or selling land to mobilize cash needed for health care costs.

The assets ownership effect is negative. It is significant in both food consumption and land equations. This implies that poor families owning land are likely to be less vulnerable to coping strategies.

The family size effect is positive. But it is not significantly different from zero in the education, food consumption and assets equations. This is due to the age structure of families.

The number of employed members has a negative effect for foregoing education and food consumption, or selling assets. But it is significant only in the assets equation at the 10% level. This suggests that the probability of making sacrifices reduce as the number of employed members increases in the family.

The number of children under five effect is positive, and is significant for education and food consumption in the family. This implies that families with more children under five years old in the malaria endemic districts are more likely to sacrifice education and food consumption when faced with payment difficulties of health care costs.

The effect of the number of pregnant women is positive, and is not significant at all. The fact to get a pregnant with malaria is not a major threat to education, food and assets of the families.

The frequency of malaria effect is positive and significant at the 1% level for both education and food consumption strategies. This implies that the higher frequency increases the probability of making sacrifices to education and food consumption in the families.

The sex of head of family effect is positive, and is not significantly different from zero in every coping strategies equations. This suggests that forego education, cut food consumption or sell assets is not particularly used by women headed of family in order to mobilize malaria treatment costs. Many poor families headed by men share a large part of those coping strategies.

The residence effect is positive, and is not significant for every type of coping strategies. This suggests poor families living in rural areas are not worst-off than their counter-part in urban areas of Cameroon.

The preventive measures effect is negative. It is significant for education and food consumption equations. This indicates that the self-protection measures at the family level reduce the probability of making sacrifices in other essential basic needs.

The principal source of income effect is positive, and is not significantly different from zero in this model.

The costs of malaria treatment effect is positive and significant at the 10% level. The probability of coping strategies increases with the positive changes in health care costs on malaria treatment.

The estimated coefficients of income, savings, fee exemptions, insurance, number of employed members in the family, preventive measures, and sex of head of the family are negative. If those variables increase, the probability of foregoing education or food consumption, or selling productive assets is reduced relatively.

With regard to the estimated coefficients for malaria expenditure, family size, per capita consumption, malaria perception and frequency are positive. Those variables have relative positive effects on the probability of families to forego education or food consumption, or sell assets.

5.1.4 - Results multiple regression model of health care costs on malaria treatment

For the 70 percent of families which did not seek professional treatment, we estimated the health care costs for use in the multinomial logit model. We used a multiple linear regression for the families which sought professional treatment, reported in Table 12, to assign health care costs (expenditures) for the families which did not seek professional treatment of malaria. This analytical approach has been used in some previous

studies of families seeking professional providers in relation to self-care (Masako, 1996).

Table 12 : Multiple regression model estimates :
Dependent variable : Health care costs on malaria treatment*

Variable	Coefficient	T-Stat	P-Value
Constant[c]	3.1764	4.2416	0.0001
Income[a]	0.0012	0.0639	0.0987
Savings[b]	0.2216	2.5987	0.0011
Fee exemptions[c]	-1.2558	-10.076	0.0000
Insurance co-payment[b]	-1.0756	-0.8278	0.0208
Family size	0.1265	0.6909	0.4914
Children <5 with mala[a].	1.5095	1.7768	0.0790
Pregnant Women with mal	0.5728	1.0143	0.3132
Frequency of Malaria[a]	0.2628	0.3476	0.0025
Perception(Serious=1)	0.3410	0.2424	0.8090
Preventive Measures[c] (Yes=1)	-2.3256	-1.6113	0.0096
Number of Observations	150		

Notes :
a. Significant at 10% level
b. Significant at 5% level
c. Significant at 1% level
R^2 : 0.863322
Adj.R^2 :0.847965
F-statistic : 56.21665
Prob(F-stat): 0.00000

*Results generated with hypothetical data and processed from Eviews software program. In addition, Costs of malaria treatment are used as proxy of expenditures.

The findings emanating from an analysis of Table 12 are as follows :

Income : The estimated coefficient of income is positive and significant at the 10% level. It indicates that an increase of about CFAFrancs 12 in expenditure on malaria treatment is expected with each additional unit (10,000 per annum) of income.

Savings : malaria expenditure is correlated with savings. Its estimated coefficient is positive and significant at the 5% level. The value of this coefficient suggests that about 22.16% of the variance in the malaria expenditure of the family is explained by its savings, holding other independent variables constant.

Fee exemptions : When families have access to fee exemptions, their expenditures on malaria treatment depend on the amount (in percentage) of exemptions. The estimated coefficient is negative and significant at the 1% level. About 125% of the variance in the malaria expenditure is explained by the access to fee exemptions, holding other independent variables constant.

Health insurance : its effect is negative and significant at the 5% level. By holding other independent variables constant, about 108% of the variance in the malaria expenditure is explained by health insurance.

Family size : its effect is positive, and is not significantly different from zero in the malaria expenditure equation.

Number of children under five : malaria expenditure is correlated to the number of children under five years old in the family. Its effect is positive and significant at the 10% level.

Number of pregnant women : its effect is positive, and is not significantly different from zero in the malaria expenditure equation.

Frequency of malaria : the expenditure on treatment is correlated with the frequency. its effect is positive and significant at the 5% level.

Perception of malaria : its effect is positive, and is not significantly different from zero.

Preventive measures : its effect is negative and significant at the 10% level. This implies that the use of

preventive measures is more likely to reduce the expenditures on treatment.

About the overall result, the variation in the independent variables account for 86.33 percent of the variance in the malaria's expenditures. It seems like adding additional independent variables in the regression equation may explain more of the variation in health care expenditures on malaria treatment. However, the adjusted R^2 is about 84.79%, this suggests the relative stability of the relationship between health care expenditures and the independent variables used in the model.

Thus, the results of Table 12 show that health care expenditures on malaria treatment in Cameroon are significantly correlated to family income, savings, fees exemptions, insurance co-payment, preventive measures, number of children under five years old, and frequency of malaria in the family. The perception of malaria, Family size, and number of pregnant women are correlated to expenditures, but they are not significant.

Section 5.2 - Policy Simulations

The simulations presented in this section consider the effects of changes in both fee exemptions and insurance coverage. First of all, we assume that fee exemptions and insurance actually cover respectively 10% and 15% of the target population. Using the mean values of all independent variables of the models from stage 2 and stage 3 separately as a benchmark, Tables 13 and 14 provide the results of changing both fee exemption and insurance coverage. The effects on probability of changes are explored in the way to predict the number of families who can afford the health care expenditures, ceteris paribus.

Table 13 : Results of policy simulation stage 2 : Probability of affording health care expenditures on malaria treatment (The effects on probability of changes in policy variables)

Variable	Can Afford	Cannot Afford
Percentage adopted→ Predicted percentage adopted ↓	20	80
1- **Fee exemptions** :		
0%	19.45	80.55
10%	20	80
30%	25.15	74.85
50%	28.35	71.65
2 - **Health insurance**		
0%	12.81	87.19
15%	20	80
25%	33.17	66.83
50%	58.14	41.86

Table 13 shows that if the fee exemptions' coverage is about zero percent, 19.45% of the families could afford and 80.55% could not afford the health care expenditures on malaria treatment. But if fee exemptions covers 30% of the families, 74.85% could not afford the medical costs of treatment. And if 50% of the poor families are covered with fee exemptions, 71.65% could not afford the health care costs.

With regard to the health insurance, the zero percent of coverage would lead to an increase of the number of families which cannot afford it (about 87.19%). If the coverage is 25% of the total target population, 66.83% of families could not afford the health care costs. But if the insurance schemes cover 50% of the population, more than 58% of families could afford while about 42% could not afford the malaria treatment costs.

Table 14 : Results of policy simulation stage 3 : Probability of affording health care expenditures on malaria treatment (the effects on probability of changes in policy variables)

variable	Forego Education	Forego Food Consumption	Sell Product Assets	Borrowing	Not coping strategies
Percentage adopted→ Predicted percentage adopted ↓	40	30	20	10	0
1- Fee exemptions :					
10%	40	30	20	10	0
30%	37.46	28.12	18.64	8.94	6.84
50%	36.98	28.21	16.24	8.44	10.1
2-Health insurance :					
15%	40	30	20	10	0
25%	31.18	24.46	14.82	8.95	20.6
50%	16.24	18.85	10.94	6.35	47.6

Table 14 shows that if the coverage of fee exemptions rises from 10% to 30% the proportion of poor families using coping strategies would be reduced to 37.46% for education; 28.12% for food consumption; 18.64 % for assets; and 8.94% for borrowing. in addition, about 6.84% of poor families would be dropped from coping strategies. But if the coverage rises from 25% to 50%, the overall proportion of families with coping strategies would be reduced of about 10.1% of the total target population. When considering the health insurance coverage, an increase to 50% would lead to a reduction of families with coping strategies of about 47.6% of the total target population.

The overall policy simulations results suggest that health insurance can improve the affordability of health care costs better than fee exemptions. This implies that success in protecting the poor through fee exemptions appears limited.