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Information, Externalities and Socioeconomics of Malaria in Honduras: A Preliminary Analysis

by

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Abstract

This paper explores how different levels of knowledge correlate with desirable preventive and curative practices against malaria in Honduras. The paper additionally analyzes "information externalities" associated with non-specific malaria health services, communicational campaigns and organized community networks. Using the 2004 ENSEMAH survey, the analysis tests for statistical differences in the means of behavioral variables and an index of household malaria knowledge, finding that the adoption of desirable prevention and treatment behaviors correlates with proficient levels of knowledge. Differences in behavior across groups with distinctive levels of proficiency were found statistically significant. Also, while information externalities exist, they nonetheless do not deliver adequate levels of knowledge proficiency to induce desirable anti-malaria behavior.

Keywords: Malaria, Information, Externalities, Honduras
JEL Classifications: D19, H49, H75, I19

1. Introduction

In spite of the strong case for investing in communication on malaria—an estimated US$1 billion in healthcare savings by 2015, for instance, if successful communication efforts led to improvements only in the current operational effectiveness of long-lasting insecticide-treated nets—Roll Back Malaria (2008) explicitly recognizes that information, education and communication (IEC) have not received the necessary international attention. The latest WHO (2008) *World Malaria Report* does not even mention IEC. Communication campaigns such as "Fight the Bite" or "Footballers vs. Malaria" are no substitute for a coordinated global communication mechanism that is able to identify and evaluate best practices and provide evidence on the effectiveness of particular channels and specific messages. Deficiencies at the national and community levels include a lack of capacity and resources for designing and implementing communication programs; lack of sustained communication with multiple channels (schools, workplace, women's groups, for instance); insufficient insights drawn from community leaders and grass roots efforts; and lack of integration of malaria communication activities with other health programs. This lack of attention on IEC is surprising given the widely documented fact that knowledge about the disease has strong implications for malaria control. Joshi and Banjara (2008) for Nepal, Keating et al. (2008) for Haiti, Tilaye and Deressa (2007) for Ethiopia and Avilés and Cuesta (2006) for Honduras are some recent studies among a long list dating back to the early Nineties.

In the absence of a global comprehensive IEC strategy to evaluate, this paper explores the presence of positive communicational externalities associated with public health interventions, health infrastructure and community networks even when they do not directly target interventions to increase knowledge on malaria. By communicational externalities we refer to increased knowledge (associated with desirable behavior) of several aspects of the disease that are not directly attributed to a deliberate IEC strategy. The underlying assumption is that exposure to health campaigns, provision of services and communication-facilitating instruments (social capital) may significantly increase and disseminate critical knowledge of malaria.

Our research focuses on Honduras, a heavily indebted country with dismal poverty levels (69 percent of the population according to CEPAL, 2008). Its reported 11,457 cases of malaria in 2006 represent nearly 25 percent of Central America's total (PAHO, 2008). Research on malaria is abundant in Honduras, and it has traditionally focused on its epidemiological

dimensions: see Sherman et al. (2008), Alger et al. (2007), Kaminsky (2006), Alger et al. (2005), Muehlenbein et al. (2005), Aguilar, Figueroa and Alger (2002), Fernández, García and Alger (2001) and Mejía-Díaz et al. (2000). Fewer studies analyze the link between socioeconomics and incidence of malaria. Avilés (2003) uses the 2001 Permanent Household Survey and epidemiological data from the Ministry of Health to report a strong correlation between malaria incidence and socioeconomic characteristics of households and communities. More recently, Avilés and Cuesta (2006) use a recent household survey, the 2004 Socio-Economic Household Survey on Malaria (ENSEMAH in Spanish), that specifically collects information on knowledge of the disease, socioeconomic features and behaviors of households (see section below). The authors explicitly construct a measure of malaria knowledge and conclude that differentials in the incidence of the disease across households are not associated with differences in malaria awareness. That study, however, does not explore the presence and implications of information externalities.

Regarding specific communication interventions in Honduras, the National Strategic Plan for Malaria 2004-2008 (Government of Honduras, 2004) recognizes a shaky epidemiological surveillance system. In addition, it does not mention any concrete IEC measure (either prior to or after 2004). Nor there is any evidence on implementation aspects such as guidelines, disbursements or geographical outreach. The Government of Honduras (2004) reports both scarce knowledge of malaria and participation in knowledge transmission at the community level. This contrasts with the position of PAHO (2006) that there is a long-lived tradition of community participation in the combat of malaria in Honduras. Neither of these positions, however, is supported by empirical evidence. Moreover, we found no relevant information on or assessment of the Ministry's ability to design and implement information campaigns or analyses. Given those restrictions, our study explores individual reports on malaria information sources by ENSEMAH interviewees.

2. Data and Methods

2.1 The ENSEMAH Survey

We use the 2004 ENSEMAH Survey designed and collected by Avilés and Cuesta (2006). The survey was collected between 10 and 21 August 2004 by a team of eight experienced Ministry of Health personnel who were specifically trained for the survey. The selection of households in

each community was randomized using available maps from the last Census in 2001. Housewives were typically the main respondents, and it was virtually unnecessary to return to the household to complete unfinished questionnaires (less than one percent of the original sample). The average length of the interviews was 75 minutes, and interviewers did not report major difficulties in understanding the questionnaire.

The design of the sample followed a stratified strategy. First, nine municipalities across the country—comprising eight departments across the Northern, Southern and Central regions—were selected in order to minimize the chance of substantive and systematic biases in the socioeconomic characteristics of the sample. Communities were selected according to a minimum and desirable set of characteristics that ensure a wide range of heterogeneity in the sample. Thus, the sample includes communities (i) with both high and low levels of malaria; (ii) with high and low socioeconomic status; (iii) in urban and rural locations; (iv) culturally-diverse communities (that is, located along the coast and in the highlands, in large and small communities, and with high and low ethnic minority presence); and, finally (v) communities benefiting from public health interventions against malaria and others without such interventions. Then, within each municipality, various communities and, within such communities, several households were selected randomly in a second and third stage, respectively. (See Table 1 for individual descriptions.) The resulting sample consists of 721 individuals distributed in 29 communities across nine municipalities, with 15 households interviewed in each community. Communities were defined as the smallest unit with some form of administration participating in the Ministry of Health community network—which may or may not coincide with the municipal-based administrative division of the State. Within each household, the survey collected information on the household as a whole and for all its members. The heterogeneity resulting from including all these features may still not avoid biases with respect to a nationwide representative random survey, but that heterogeneity ensured that such biases were minimized as key socioeconomic characteristics were not overlooked or omitted. In fact, the ex-post comparison of the average household from the pilot survey and the average household from the 2004 Permanent Household Survey confirmed that the household size, education of the household head and average age of household members were reassuringly close.

The survey was articulated in six modules. The first module produced a socioeconomic characterization of the household and its members. It captured demographic and geographic

information of the household; the access of its members to public services; and household members' labor, education and income levels.

A second module investigated conditions and habits related to members' health, separating three sub-modules: one, relative to hygiene and health habits; another to general health conditions; and a last one relative to knowledge, perceptions, and presence of public health interventions within the municipality. In concrete terms, questions regarding hygienic practices at home included: water purification practices, presence of unleashed animals, personal hygiene (number of baths, time dedicated to personal hygiene per day), washing hands before dealing with food, house cleaning (floor, kitchen, toilets) and garbage disposal. Other questions inquired about whether household members avoided stagnant water around the house, whether they engaged in fumigating practices, cleaning the sink inside and outside the house, used mosquito-nets at doors, windows and beds (of both children and adults) and fumigated mosquito-nets. Health condition questions specifically referred to weight, height and wrist diameter. Diet information referred to basic nutrients being part of the regular diet. Regular exercising and alcohol and cigarettes intake was also asked about, as well as whether members of the household suffered from chronic diseases; whether they were hospitalized; number of visits to hospitals and health centers; nature of attention received, and details on follow-up check-ups and treatments. Variables on public health policies referred to whether household members were beneficiaries of health and education programs; their knowledge of programs for prevention and treatment of malaria and other communicable diseases sponsored by the Ministry of Health.

The third module of the survey collected individual knowledge on malaria by enquiring about the individual knowledge on causes, prevention, transmission, curative practices and treatment. Spontaneous responses were solicited to interviewees on the following questions:

[1] Do you know what malaria is?
[2] Is malaria a contagious disease?
[3] What are the symptoms of the disease?
[4] How can you prevent the disease?
[5] How is it transmitted?
[6] How is it cured?
[7] Is there any treatment for malaria? If so, what does it consist of? The interviewer was trained to identify the correct answers in terms of name of the drugs, length of the treatment, number of doses for adults, number of doses for children and pregnant women and secondary effects
[8] How did you learn about the disease?

The fourth module obtained information on the presence of malaria among members of those sampled households, creating an information log of the disease during the previous month, last year, and beyond. The survey, however, did not conduct a proper analysis of how those previous episodes were contracted in the first place (from contagion risky behaviors, weather factors, or recurrent and seasonal outbreaks, among other factors).

The fifth module was divided into two blocks, one directed to those households in which members had suffered or were suffering at that point from the disease, and the other, directed to those households that had never experienced episodes of malaria. Behavior captured in these modules included their first response in dealing with the disease, i.e., whether they went to the hospital, were attended by a family member or self-treated. Other questions referred to whether they confirmed the diagnosis with a blood test and, if so, where; which treatment did they follow; where did they receive the first dose; whether they completed their treatment once initiated; and how much time passed since they felt the symptoms until they received the first dose. There were additional questions for women who had children, inquiring about pregnancy controls, whether they were treated from malaria, birth control and vaccinations of children.

The sixth and last module collected information on the characteristics of the community where households were located, especially on its epidemiological vulnerability and the presence of public health institutions. Specific questions included the location of the nearest hospital, health center, doctor or traditional healer, and interviewees were asked to report distance and time needed to reach those facilities or care providers. Other questions aimed at informing on social capital and networks in the community and asked about the presence of community organizations, their involvement in municipal decision-making and the participation of household members in those organizations (for instance, whether and how often they attended meetings) as well as their perception on the work of those institutions on health-related issues. A final set of questions captured individual perceptions on the role of the Municipality in public health activities in the community.

2.2 Methodology

The analytical methodology consists of estimating the mean of household knowledge of the disease across distinctive groups of households or communities determined by three dimensions: (i) the adoption of preventive and curative practices; (ii) the presence of health infrastructure and policy interventions; and (iii) the level of social capital in the community. A statistical means test is performed on each of the incumbent groups, for example, on the mean value of the index of knowledge across households pertaining to communities with a high level of social capital vis-à-vis households in communities with low levels of social capital. In as much as those means are statistically different across categories, we conclude that there are differences that are associated with different levels of knowledge on malaria. Of course, the definition of high and low levels of key variables such as knowledge, social capital, and hygiene, among others, is not exempt from some degree of arbitrariness. Cut-off points were selected, however, to capture clearly distinctive groups, as indicated below. In addition, it is worth noting that this methodology exploits the original information of the survey, but should not be taken to conclude on causality between knowledge and the other dimensions analyzed. As such, our exercise is an initial exploration of the presence of externalities related with communication and their statistical significance. A specific identification of the operating channels or the exact quantification of the externality (in terms of its economic or epidemiological impacts) is beyond the scope of the study.

3. Results

3.1 Knowledge of Malaria

Most households interviewed—over 90 percent—report knowing what malaria is (see Table 2), a result in line with Avilés and Cuesta (2006). Interestingly, there are no substantive differences in the acknowledgment or awareness of the disease by location (urban, rural and regions), demographics, gender of the household head, income levels, educational attainment, or access to basic services. However, these results change when we analyze the *level* of knowledge of the disease. We construct an index capturing more objectively differentiated levels of knowledge. The index counts the number of correct answers to six questions specific to the disease. A score below four is considered to capture a low-to-intermediate level of knowledge, while scores of four or above are assumed to capture a high level of knowledge. The questions and correct answers, as proposed by the Ministry of Health in Honduras, are the following:

Do you know:	Correct answer:
1. whether malaria is contagious?	Yes
2. what its main symptoms are?	Fever, sweating, convulsions
3. how to prevent it?	Avoiding mosquito biting, hygiene
4. how is it transmitted?	Mosquito bite
5. how is it cured?	Drugs
6. the name, doses and length of treatment?	Cloroquine and Primaquine combined (only chlorine for pregnant women); 14 days for adults, 3 days for under-14s.

Evidence resulting from the index corroborates an average high level of knowledge across interviewed households, although it is no longer nearly universally distributed—as was the case with self-reported acknowledgement of the disease. Some 70 percent of the sample obtains a score of four or more on the six-point index. We now observe wide gaps by location, income and education levels, demographics and access to basic services. Rural households; households in the Central region; those headed by individuals with college education; and larger households (more than eight members) fare particularly well in the knowledge index. Contrary to self-reported awareness, male-headed households now report higher scores in the knowledge index than female-headed households. This might be related with socioeconomic differentials between the two types of households (female-headed households being typically less educated, for instance) than to gender-specific differences causing lower levels of knowledge.

3.2 Knowledge of Preventive and Curative Responses to Malaria

Avilés and Cuesta (2006) report that socioeconomic factors do not condition the adoption of preventive behavior: almost 90 percent of the ENSEMAH sample reports following one or more preventive practices. Complementing that result, we explore the relation between engaging in preventive practices and the distribution of knowledge on the disease. Following Avilés and Cuesta (2006), our index of preventive behavior gives a maximum value of six to households whose members follow certain preventive practices: fumigation; removal rainwater water around the house; protection of doors and windows with nets; protection of all beds with mosquito nets; and spraying insecticide on the mosquito nets inside the house. Our results show that the number of preventive practices adopted by the household is effectively correlated with the level of knowledge about the disease. Households adopting more preventive practices also score higher

on the knowledge index. Specifically, households fumigating their mosquito bed nets know more about malaria than households not fumigating their bed nets and those not using nets at all. Interestingly, those fumigating their nets score an average above four (high knowledge), while those not fumigating their nets score an intermediate level. Those differences are statistically significant (see Table 3). Similarly, households with an above-average score in terms of hygienic practices also fare better in terms of knowledge of malaria. The difference is statistically significant, and it is especially notable in the case of personal hygiene (vis-à-vis time spent on household cleaning and water purifying practices). We additionally find that the level of knowledge is related to completion of treatments once started; according to Avilés and Cuesta (2006), some 85 to 90 percent of patients complete treatments once they start them. In effect, Table 3 shows that better knowledge correlates with treatment completion. Households with complete treatments average a half-point higher knowledge score than those households with incomplete treatments, which is statistically significant. They are also very close to our category of high levels of knowledge (that is, bordering a score of four).

3.3 Information and Community-Based and Public Health Interventions

Avilés and Cuesta (2006) report that the social capital of a community—as measured by the number of community organization—has a significant effect on malaria levels of malaria: those communities with six or more community organizations report significantly fewer episodes of malaria. Our analysis complements those results by showing that the presence of community organizations—including civil committees (*patronatos*), women's organizations, water councils, sports associations, and cultural and religious organizations—is correlated with higher levels of knowledge of the disease. Households in communities with a greater presence of organizations have a statistically significant higher knowledge of the disease than those belonging to communities with one organization or none. In fact, households in communities with two or more organizations average a high level of knowledge (above four), while those with little or no presence obtain only an intermediate score in the knowledge index (below four).

Interestingly, the presence of health infrastructure and services in the community is also correlated with level of knowledge. In communities where health services (hospitals and primary care clinics) are present, knowledge of the disease averages higher scores than in those locations where there is absolutely no presence of health institutions and/or services. The difference in the

knowledge index among households pertaining to each type of municipalities is statistically significant. However, there seems to be no difference in knowledge scores between households in municipalities with CESAMOs, CESAREs (urban and rural clinics, respectively) and public hospitals present vis-à-vis those in municipalities with only volunteers, traditional healers or private doctors. Given that the knowledge index captures a wide variety of aspects, both private and public health providers seem to do a similar job in the transmission of relevant knowledge about malaria.

Finally, we explore the link between exposure to health information, on the one hand, and level of knowledge of malaria, on the other. Unfortunately, ENSEMAH does not specify whether exposure to and/or participation in health information campaigns refer specifically to malaria vis-à-vis other issues. But the lack of evidence on malaria-specific IEC in Honduras suggests that such campaigns are targeted to other health-related issues. Households reporting that they "know" about preventive health programs score statistically significant higher averages of malaria knowledge than those who report only having "heard: about such programs. The former group scores close to four in the six-point scale knowledge index; the other group, 3.42. Interestingly, households benefiting from children's vaccination programs have a statistically lower level of knowledge of the disease than those not benefiting from vaccinations. A possible explanation of this result is that municipal vaccination schemes constitute a proxy for municipalities with higher health vulnerabilities (including vulnerability to malaria) or a proxy for communities where households engage in higher-risk practices from a health perspective (which may ultimately also affect the probability of contracting malaria).

We further explore the relationship between the knowledge of malaria associated with household participation in health information campaigns and households' reported satisfaction from participation. Again, ENSEMAH does not distinguish the specific health issue subject to the information campaign or what level of involvement is referred by participation. Yet, those households reporting satisfactory participation obtain a higher average score on malaria knowledge than those participants with low satisfaction and non-participating households. The difference in scores is statistically significant. Interestingly, non-participating households have higher malaria knowledge than those participating unsatisfactorily, although the gap is not statistically significant. This is a relevant result, as information campaigns perceived to be

unsuccessful may have essentially the same results as conducting no campaign at all, while nonetheless incurring a cost.

4. Discussion

Our results add to the knowledge on the socioeconomics of malaria in Honduras. The presence of malaria is not only associated with socioeconomic characteristics, but knowledge on the disease is also socioeconomically conditioned. Contrary to self-reported awareness of the disease, differences in *levels* of knowledge are associated with socioeconomic and demographic factors. While 90 percent of interviewed households in the ENSEMAH sample report knowing what malaria is, a notably lower 70 percent of sample households have what we consider proficiency in the specifics of contagion, prevention and treatment of malaria. This is relevant from a policy point of view, as it is unlikely that merely *any* or limited knowledge of malaria would be sufficient to induce desired behavioral change in order to control and reduce disease levels. Households reportedly fumigating their mosquito bed nets or spending more time on personal hygiene average a high level of knowledge of malaria vis-à-vis the low to intermediate level of knowledge reported by households simply using mosquito bed nets or employing little time in personal hygienic practices. Ensuring the adoption of the most effective preventive and curative behaviors most likely requires a certain high level of knowledge successfully transmitted to the public. If IEC interventions do not transmit such standards of proficiency, the impact on behavioral change may be significantly affected. Malaria-specific IEC must therefore incorporate this notion of a substantive knowledge threshold in its design. Also, our results suggest the need to target knowledge transmission according to socioeconomic level rather than engage in universal campaigns, as socioeconomic factors condition the knowledge as well as the incidence of malaria.

In the absence of an IEC campaign specifically targeting malaria during the period studied, our results suggest the presence of externalities associated with health information campaigns and health infrastructure (be it public or private, organized or informal). The existence of communication networks in the form of a critical mass of community organizations (even when they are not exclusively related to malaria or even other health issues) affects levels of malaria knowledge. This evidence suggests that information channels may be effectively transmitting desirable messages to combat malaria even when they are not specifically tailored or

conceived to do so. However, the existence of informational externalities does not undermine a strong demand for malaria-specific IEC strategies. Although further research is needed in this area, these externalities may result from the fact that different diseases share common desirable preventive behaviors. In any case, the diversion of efforts and resources away from the original objectives of the IEC intervention also represents a social cost. Most fundamentally, those externalities do not ensure that an IEC campaign that is malaria-unspecific delivers a proficient level of knowledge sufficient to effectively alter household behaviors against malaria.

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Table 1. Characteristics of the Individuals Sampled in ENSEMAH 2004

	Presence of Malaria (% of households reporting episodes of malaria over total sample of households)	
	Last Month	***Last Year***
Household Geographic Location		
Urban	2.11	3.42
Rural	1.80	7.48**
Region		
Northern	0.42	7.56**
Central	4.40	3.96
Southern	1.20	4.41*
Household Socioeconomic Status		
Income Quintiles		
Q1-poorest	1.63	5.69*
Q2	3.02	6.79*
Q3	1.63	1.63
Q4	0.00	0.00
Q5-richest	0.00	11.76**
Household head's level of education		
No Education	0.87	4.36**
Completed Primary	3.58	6.81
Completed Secondary	2.27	9.09
Technical Education	0.0	0.00
University Education	0.0	0.00
Basic Services in the Household		
Water Provision		
Public	1.29	3.09
Collective or Private	0.0	0.00
Community-based	2.84	6.38
Well	4.21	10.24**
Location of Water Connection		
Outside the Property	1.82	5.45
Inside the Property	1.99	5.36**
Sanitation Services		
Toilet	0.99	2.31
Latrine	2.79	7.82**
Does not have	1.89	5.66
Disposal		
Sewerage	1.12	0.56
Septic Tank	2.33	7.20**
Electricity Provision		
ENEE (Public) or Others	2.12	4.23*
Does not have	1.00	12.00**
Individual and Demographic Characteristics of the Household		
Number of People in the Household		
3 or less	2.90	5.80
4 to 8	1.78	6.14**
More than 8	2.14	2.14
Sex		
Female	2.81	6.87*
Male	0.90	3.61**
Sex of the Household Head		
Male Household Head	1.04	2.08
Female Household Head	4.76	7.14**
No. Observations		

Source: Avilés and Cuesta (2006) from ENSEMAH 2004
Note: (**) indicates that the null hypothesis of equal means is rejected at 1% level. (*) indicates that that null hypothesis is rejected at a 5% level.

Table 2. Socioeconomic Factors and Information on Malaria

	Know What Malaria Is (% of households reporting yes over total sample of households)	**Knowledge about Malaria (Index 0-6)** (% of households reporting 4+ over total sample of households)
	Yes	***4+***
Household Geographic Location		
Urban	93.43**	68.31**
Rural	90.29**	88.98**
Region		
Northern	89.75**	76.70**
Central	97.36**	80.76**
Southern	89.20**	77.86**
Household Socioeconomic Status		
Income Quintiles		
Q1-poorest	92.27**	81.88**
Q2	91.35**	78.17**
Q3	91.47**	71.78**
Q4	89.13**	75.64**
Q5-richest	100.00**	83.33**
Household head's level of education		
No Education	91.27**	71.68**
Completed Primary	92.28**	85.82**
Completed Secondary	100.00**	79.98**
Technical Education	85.00**	85.00**
University Education	100.00**	100.00**
Basic Services in the Household		
Water Provision		
Public	91.75**	66.93**
Collective or Private	100.00**	100.00**
Community-based	99.31**	96.66**
Well	88.62**	92.89**
Location of Water Connection		
Outside the Property	98.36**	92.69**
Inside the Property	92.20**	78.24**
Sanitation Services		
Toilet	95.37**	66.65**
Latrine	89.58**	87.55**
Does not have	88.67**	88.68**
Disposal		
Sewerage	97.19**	58.46**
Septic Tank	90.18**	85.09**
Electricity Provision		
ENEE (Public) or Others	93.48**	76.21**
Does not have	83.17**	90.71**
Individual and Demographic Characteristics of the Household		
Number of People in the Household		
3 or less	94.20**	54.98**
4 to 8	91.40**	78.80**
More than 8	92.85**	90.91**
Sex		
Female	92.89**	77.63**
Male	90.80**	79.04**
Sex of the Household Head		
Male Household Head	91.75**	79.75**
Female Household Head	90.47**	66.65**

Source: Authors' compilation based on ENSEMAH 2004.
Note: (**) indicates that the null hypothesis of equal means is rejected at 1% level. (*) indicates that that null hypothesis is rejected at a 5% level. The "know what malaria is" column reports the means test t-statistic for households with yes-answers vis-à-vis households responding "does not know what malaria is". "Knowledge about malaria" is an index with scores between 0 to 6, as explained in the main text. The column in this table groups the proportion of households in the sample with 4 to 6 correct answers. Equal means tests of that category are conducted against the category of households responding 0 to 3 correct answers.

Table 3. Behavior, Social Capital, Public Interventions and Information on Malaria

	Knowledge Index Mean	Means Test t-statistic
Preventive Practices		
a) Hygiene		
Households with low hygiene score	3.48	-2.87**
Households with high hygiene score	3.76	
Households spending below average time on personal hygiene	3.55	-2.86**
Households spending above average time on personal hygiene	5.00	
Households spending below average time on household cleaning	3.56	-0.27
Households spending above average time on household cleaning	3.60	
Do not purify water	3.51	-1.48
Purify water	3.65	
b)Use of mosquito nets		
Households not using mosquito nets or using them only in some beds	3.54	0.37 [a]
Households using mosquito nets in all beds	3.78	
Households spraying mosquito nets with insecticide	4.26	-3.00**
c) Other preventive practices		
Households adopting none or one preventive measures	3.43	-1.90**
Households adopting 2 or more preventive measures	3.62	
Curative Behavior		
Households with incomplete treatments	3.33	-2.07**
Households with complete treatments	3.85	
Social Capital		
Households participate in 0 or 1 community organization	3.29	-9.21**
Households participate in 2 or more community organizations	4.15	
Health Infrastructure		
Municipalities has public hospital, public clinic, CESAMO and/or CESAR	3.58	-0.52 [a]
Municipalities with volunteers, private doctors or healers	3.57	
Municipalities with no health personnel nor health centers	3.12	2.98**
Health Interventions		
a) Health Campaigns		
Have heard about prevention treatment programs from the Health Secretary and know all or some programs	3.90	-5.12**
Have not heard about the programs or if heard, do not know about them	3.42	
b) Vaccination Programs		
Households benefited from the vaccinations program	3.87	2.13**
Households did not benefit from the vaccinations program	4.17	
c) Participation in Health Programs		
Household has not participated in any health program	3.38	-4.56**
Household has participated in one or more health programs	3.79	
Health Information Campaigns		
Individuals have not participated in health information campaigns	3.11	-5.13** [a]
Individuals have participated in health information campaigns	3.72	
Individuals satisfied with the information received	3.76	-2.48**

Source: Authors' compilation based on ENSEMAH 2004.
Note: (**) indicates that the null hypothesis of equal means is rejected at 1% level. (*) indicates that that null hypothesis is rejected at 5% level. Tests are performed on the means of the categories reported in the first column of the table. (a) indicates that the first refers to the mean differences of the first two subsequent categories in the table, while the following test compares the mean of the first and third categories considered: that is, between households not using mosquito nets and those using nets in all beds; and between households not using mosquito-nets and those fumigating all mosquito nets, respectively.