

**ADDIS ABABA UNIVERSITY, FACULTY OF MEDICINE, DEPARTMENT OF
COMMUNITY HEALTH**

**WILLINGNESS TO PAY FOR INSECTISIDE TREATED BED NET, ITS
UTILIZATION AND INFLUENCING FACTORS IN ARBAMINCH ZURIA
DISTRICT, SNNPR, ETHIOPIA**

**A thesis submitted to faculty of medicine Addis Ababa University in partial
fulfillment of the requirements for a Masters Degree in Public Health**

By

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**ADDIS ABABA UNIVERSITY
SCHOOL OF GRADUATE STUDIES**

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Approved by the examining board

Abstract

Background: Many researches have shown that insecticide treated bed nets (ITNs) are the most cost effective way of preventing malaria and WHO roll back malaria program emphasizes the use of ITNs as one of the key malaria control measures.

Objectives: To evaluate the ability and willingness to pay for ITN in the rural community, assess ITN's utilization and influencing factors in Arbaminch Zuria District.

Methodology: This study was a quantitative cross-sectional community based study in randomly selected malarious kebeles of Arbaminch zuria district of GammoGofa zone, SNNPR. Four rural Kebeles were selected using simple random sampling from the district. The study tool was a pre-tested interview administered structured questionnaire. A total of 982 head of households were interviewed. To assess willingness to pay, contingent valuation using binary with follow-up method was used.

Result: The mean number of net per household was 0.6 and for those who possess at least one bed net, the mean number of individuals per net was 4.9. One hundred and eighty five (21.8%) of the total under-fives slept under a net the previous night. Around 86 % of the respondents were willing to buy ITN if supplied by the market. The average maximum WTP for a blue conical ITN was 26.2 ETB, for a white conical ITN was 25.7ETB and that of a blue rectangular ITN was 13.6ETB. The community's willingness to pay is found to be affected by socio-economic factors, perceived benefit of ITN, previous source of bed net and characteristics of the bed net.

Recommendations: To design proper IEC techniques on malaria. To utilize the available community's willingness to purchase ITNs, on some group of population to assist the free distribution for those who deserve and make the supply sustainable. To increase the bed net coverage per house-hold and the proportion of vulnerable who utilize bed nets.

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List of Acronyms

ETB: Ethiopian Birr

IEC: Information education and communication

ITN: Insecticide treated bed net.

LLINs: Long lastingly insecticide treated bed nets

MOH: Ministry of health

RBM: Roll back malaria

SNNPR: Southern nation, nationalities and peoples region

WHO: World health organization

WTP: Willingness to pay.

Introduction

Malaria kills a child somewhere in the world every 30 seconds. The majority of the deaths it causes occur in Africa. Malaria is a major factor in Africa's high rate of infant and maternal mortality, of low birth weight, of school absenteeism, and of low productivity in farming and other work (1, 2).

Ethiopia is one of the sub-Saharan Africa countries that are seriously affected by the disease. About three quarters of the total area of Ethiopia is malarious and an estimated 48 million people, 68% of the population, lives in areas of risk for malaria (3).

Annually up to 6 million clinical cases were reported. However the estimated number of clinical malaria cases is 8-10 million. In 2004/2005 the disease has been reported as the first cause of morbidity and mortality accounting for 16.6% of out patient consultation, 15% admissions and 29% deaths (4, 5).

Insecticide treated bed nets (ITNs) have been shown to significantly reduce malaria related morbidity especially among pregnant mothers and children under- five years of age. Due to its efficacy in reducing the burden of malaria disease, WHO roll back malaria program emphasizes the use of ITNs as one of the key malaria control measures in holo-endemic countries. This is in order to reach the millennium development goal which targets to halt by 2015 and began to reverse the incidence of malaria. One of the indicators for this goal is the proportion of population in malaria risk areas using effective malaria prevention and treatment measures (6, 7). The roll back malaria partners include, WHO, UNICEF, World bank, USAID, Ireland Aid, the Italian cooperation and many others.

Cognizant of this the Ministry of Health in collaboration with key Roll Back Malaria partners, has developed an ITN national strategic plan from 2004-2007 with the objective of increasing the coverage and current utilization of ITNs by 10% per year in all highly malaria endemic areas to reach a target of 60% by the end of the year 2007 with emphasis on pregnant women and under five child through public distribution, private sector and social marketing (3). Based on the review reports and findings of the DHS 2005, the achievement thus far is way below the set targets. The status of coverage of interventions in 2005 stands at 5% for access to effective treatment within 24 hours and only 24% households own at least one ITNs

In Ethiopia distribution of ITNs through the health care delivery system was first introduced with in returnee and resettlement sites in the western part of Tigray Region, in 1997. In 1997-1998 ITN was also distributed in Oromia, Amhara, and SNNPR Regional states with the support of WHO and Italian corporation. Following this small scale ITNs distribution, in 2000-2003 Unicef donated a total of 1.42 million ITNs. As of January 2004; approximately 950,000 nets have been delivered to the regions.

Statement of the problem

ITNs are new to many people and there are many people who are vulnerable to malaria who are too poor to afford one. The government also cannot afford to give free nets to all. Hence a subsidized ITN market needs to be established well, since subsidized sales of ITNs can effectively introduce the component of sustainability and self reliance in prevention of malaria (8).

Measuring the willingness and ability of the consumers to pay for a certain medical service or

item has become important because of the interest among governments and NGOs in increasing their reliance on user fees to finance health service delivery. Much of the interest is based on a practical need for more revenue as traditional (budgetary) sources of finance are failing to keep pace with rising costs and utilization (10). On the other side, several African governments are adopting user fees and promoting self-financing health care to help restore efficiency and equity to national health systems. User fees in public health facilities help to promote equity because the demand for health care rises disproportionately with income. People who are well off are more able and willing to pay for costly services, so charging wealthier people for service they demand and can afford and pooling those revenues to subsidize those least able to afford care is a way to improve health care delivery to the poor (21).

Therefore, assessing the community knowledge, attitude and practice on ITN, its utilization and their willingness and ability to pay as well as factors influencing it would generate a vital information that has important contribution in the evidence based redesign of malaria control policies and strategies.

Literature review

Effectiveness of ITN in reducing malaria morbidity and mortality

Insecticide treated bed nets have become important tools in the prevention of malaria in highly endemic areas. No less than 81 trials and over 30 descriptive studies carried out in every type of malaria setting world-wide have documented the positive impact of ITNs on child and adult morbidity and mortality. In five randomized controlled trials an overall reduction in child mortality of 17% was demonstrated with six lives saved per year for every 1000 children protected (11). In Tanzania, studies have shown that ITNs reduce child mortality by 25.3%, parasitemia and malaria related anemia by 60% and 50% respectively (16).

An ITN trial and socio- economic analysis in western Kenya showed that treated nets are cost effective, widely accepted, and valued by the rural population that participated in the trial. However that particular research also found that most members of these subsistence farming communities cannot afford to purchase nets by themselves. During this trial geographic analysis showed that some of the impact of the ITN derived from mass killing of mosquitoes over large areas, allowing researchers to detect improvement in the health status of children without treated nets who were living close to villages with treated nets. This community (herd) level effect is most evident where most houses have treated nets and reinforces the need to find ways to ensure that all Africa population at risk for malaria have access to these devices. Thus even though young children and pregnant women are the primary beneficiaries of treated net use, benefit for these most vulnerable groups is highest if all community members have and use them (15).

Factors affecting utilization of ITNs

Household possession of ITNs indicate the extent to which distribution channels are enabling high coverage and may be particularly valuable at the early stage of program development and implementation. But utilization is what ensures protection and therefore a more useful predictor of epidemiological impact. In many parts of Africa, the proportion of children under five years of age who slept under a net during the night preceding the survey was considerably lower than the proportion of house-holds that possess a net (25). In a study in Tanzania, only 20% of the respondents owned a mosquito net and much less proportion of them utilized it (16). In the study, humidity and seasonality (low density) of mosquitoes were mentioned to be among major reasons that impeded net use.

In Ethiopia, a study in Jimma zone, showed that 50.2% Of the households possess at least one ITN, however ever use by young children was only 37.6%. The lion share of this discrepancy was explained by the use of nets for other purposes than primarily intended. Other factors like age of the head of the house-hold, educational status, occupation, knowledge on malaria and possession of beds were found to be predictors of utilization. In this same study the utilization of ITNs by under-five children was found to be low as compared to those above five years of age (26). A higher use of mosquito nets was also observed on male adults in other Sub -Saharan African countries (28). This is explained by virtue of their age and position as family income earners get priority coverage.

The source of bed nets was also found to have a significant impact on its utilization; those who obtained bed nets through a free distribution utilize ITNs much less than those who purchased it (26). Thus distribution efforts were also mentioned as possible contributors to malpractices,

though this does not speak against the benefit of properly conducting free distribution for those who deserve it (26).

Factors affecting willingness to pay for ITNs

Individual's willingness to pay for ITNs is found to be affected by various factors. In a study in Tanzania, results from multivariate analysis shows that, nuisance of mosquito bites, age of the respondents, knowledge of malaria transmission, prior possession of bed net, distance to the health facility and self rated ability to pay as being significantly associated with individuals maximum WTP. Apart from individuals' social and economic background, characteristics of an ITN had a great impact on WTP .Even when the same price was charged to ITNs of different attributes, the size (4 feet), color (blue), and shape (rectangular) in that order were relatively more important attributes in determining the willingness to pay for an ITN (16).

Another study in Tanzania has tried to look the role of gender on WTP for ITNs and found that, females were less likely to be willing to pay for ITNs , that have higher price, and more likely to pay for ITNs having lower price as compared to males (17).

In a baseline survey in four regions of Ethiopia, SNNPR, Tigray, Amhara and Oromia, a large majority (87%) of the respondents did not own mosquito net. The main reasons cited being lack of knowledge, unavailability of mosquito net and lack of money to purchase it. Affordability is one of the determinant factors that impede the possession and use of ITNs. This becomes more severe in areas where the community lacks prior knowledge and culture of using the nets. As to their maximum WTP, 47% suggested 10 Birr or less, 11% said 11-20 Birr, 28% from 21-50 Birr

and the rest mentioned 51 Birr and above (18).

Another study, which was done in Western Shoa Zone, shows that, 96.7% of respondents did not have any information about bed net and 99% did not have prior experience of using bed net but only 4% of them were unwilling to pay for ITN. The main reasons for unwillingness were inability to afford and lack of confidence in the bed net. In this study 81 % of the respondents were willing to pay up to Birr 50, with a wide range of 10 Birr or less up to 50 Birr for a medium size rectangular net (19).

Ability and willingness to pay

The phrase willingness and ability to pay refers both to preference and behavior on the part of financially constrained consumers. The consumers preference are formed on the bases of three considerations: a consumer needs and desires, information about the existence and characteristics of a good or service and judgment about ones own probable benefit from that good or service relative to ones other needs and desires and capacity to satisfy them, given the price and the cost of the transaction (10).

Thus when one speaks of studying the willingness and ability to pay for health care, one is talking about studying consumer demand for health care services (10). There are two main methods for assessing willingness to pay, the contingent valuation method and choice experiments. These methods have generally been used to set a monetary value on a package of health and/or non

health benefits in the context of a specific intervention (14). The contingent valuation method involve constructing a hypothetical market for the commodities and asking individuals directly the maximum amount they are willing to pay to have the commodity in question or the minimum amount they would be willing to accept in compensation to be deprived of it. This contingent market must be realistic and the question formats should mimic the way that people usually purchase goods and services to help people think as they would in everyday market situations (12)

Values are elicited in contingent valuation method through various techniques including the binary with follow-up method, where a price for the good is presented to the respondent and they are then expected to give a "yes or no" response. In either case, there is a follow-up open-ended question to determine the maximum amount they are willing to pay. The bidding game also presents the respondent with an amount and asks whether they are willing to pay it. However, depending on their response, they can then bid up or down using pre-set options. The structure haggling technique is like the bidding game, but it has more options so as to more closely resemble market place bargaining (13). In general there is no consensus as to which technique of eliciting willingness to pay is most appropriate or superior among researchers. Every technique has its own pros and cons but recently most researchers choose the binary with follow-up method because it simplifies the respondent's valuation choice. For most purposes the bidding game technique is not recommended since it is prone to starting point bias. Each of the other technique requires the researcher to be sensitive to their potential drawbacks (20). In our research also the binary with follow-up method will be used.

The problems that arise in contingent valuation studies are the biases caused by survey design,

respondent behavior and the hypothetical nature of the survey. Strategic bias occurs when respondents are asked to value unfamiliar and non-market goods. Information bias occurs when the information provided by the interview is not clear to respondents, while compliance bias arises when respondents somehow give a WTP amount that differs with their true WTP amount to please the interviewer. Although there are the stated biases, the true cost of a given disease on the welfare of the household can be determined by the value that they would be willing to pay to prevent the disease. Therefore contingent valuation is a method, which is more comprehensive, easy to implement, and various such studies have shown consistency with market based valuation studies (20).

In making price decisions, managers of social programs face an equity dilemma, the problem of balancing the need for program sustainability with social goals of making services available to low income clients. Raising prices too high will deny services to poor clients. However maintaining needlessly low prices will perpetuate reliance on external donors (9). Therefore, assessing the community knowledge, perception on the utilization of ITN and their willingness and ability to pay as well as factors influencing them is mandatory. These will assist policy makers in understanding demand and setting prices in order to redesign strategies to scale up implementation of malaria prevention and control programs

In Ethiopia, despite the intense activities pertaining to the distribution of ITNs, many questions remain unanswered these includes, the extent to which people are aware of the benefit of ITNs, the value they give it, factors affecting its utilization. The community's willingness to purchase

ITNs, which indirectly shows the demand, and the individual and external factors influencing it, is another issue that needs to be assessed. This study was conducted to evaluate these gaps in the rural community of Arbaminch zuria woreda.

Objective of the study

General objective

- To determine the community's willingness to pay for ITNs and to assess the bed net utilization and influencing factors in Arbaminch Zuria district.

Specific objectives

- To estimate the community's willingness and ability to pay for ITNs
- To identify factors which affect (influence) the community WTP for ITN.
- To assess the utilization of ITNs and identify factors affecting it in the community.
- Assess the community KAP on malaria and ITN

METHODOLOGY

Description of the study area

The Southern Nation's Nationalities and Peoples Regional State is the third most populous region in the country with a total population of about 12 million people. Administratively the region has 13 zones, 8 special woredas and 70 woredas (22). According to the report of the Regional Health Bureau, of the total land area of SNNPR, more than 65% of the total population is at risk of malaria . Around 80% of the total districts in the region are malarious. From 2001- 2005 there were 3,406,568 malaria cases, 53,795 admissions and 4,397 malaria deaths in the region (23).

Gammo Gofa is one of the 13 zones in the SNNPR with an estimated population of 1,283,634. Its capital city Arbaminch is located 505km south of Addis Ababa and 275km from Awassa, the regional capital. The zone covers total area of about 12,210 sq. km with about 70% of the area being either lowland or midland. About 90% of the people depend on subsistence farming for means of living. Infectious disease represents the main health problems in the zone (23).

Arbaminch Zuria district is one of the districts of the zone with a total population of 224,170 of which 155,873 are living in rural areas. Out of the 9 malaria endemic rural Kebeles, the selected specific study sites were, "Lante, Chano Mille, Chano Chalba, Chano Dorga" rural kebeles. According to an informal report from the zonal health desk, ITNs distribution has been started since 2001 to vulnerable groups. In the year 1996- June 1997 EC, around 6000 ITNs are distributed for 8 kebeles of Arbaminch Zuria District for pregnant mothers and under-five children, initially with subsidized price of 25 Birr and later free of charge.

Study design

The study was a cross sectional community based study conducted in four randomly selected malarious Kebeles of Arbaminch Zuria District of Gammo Gofa Zone, SNNPR.

The study tool was a pre-tested interview administered structured questionnaire. The head of the household or one adult member representative of the study household was interviewed. If there was no adult member of the household the interviewer moved to the next household.

The questionnaire had three parts: The first part assessed the socio demographic characteristics of the respondent. The second part of the questionnaire dealt with malaria related variables including knowledge on transmission and prevention and knowledge and practice of using ITNs including retreatment of bed nets. ITN utilization was assessed by asking last night use and checking whether the bed net is hanged above their bed or other sleeping place. Third part of the questionnaire assessed the ability to pay of the respondent in terms of income, occupation, presence of electricity, piped water, radio, etc in the household. To assess their willingness to pay, the hypothetical market scenario was used. The advantage, the distribution and payment mechanism was explained and every respondent was shown three different qualities of ITN. Then respondents were asked a yes or no question of their willing ness to pay for the ITN at a certain price, given after market survey followed by series of price options and the maximum amount he/she is willing to pay for the item. If a respondent was unwilling to pay, he/she was asked the main reasons for the refusal.

Study population

The source population for the study was all inhabitants living in the 9 rural Kebeles of Arbaminch Zuria District.

Study participants

All inhabitants of the four malarious kebeles of Arbaminch Zuria District, "Lante, Chano Mille, Chano Cholba and Chano Dorga" who were picked by the sampling were included .

Sample size

For estimating willingness to pay was calculated using the formula:

$$n = Z^2 p (1-P) / d^2$$

Taking price of ITN as the main determinant for WTP,

Where, P= proportion of households who are willing to pay an ITN at average price of 25 Birr (estimated to be 25% from MOH survey, where WTP at 21-50 Birr is 28%), at 95% CI and d=4%, it gives a sample size of 450. Adding a design effect of 2 and non-response rate of 10%, total sample size of 990.

Since the sample size for WTP is higher than the sample size required for assessing utilization, a total sample size of 990 was taken for the whole study.

Sampling procedure

From the total 9 malaria endemic kebeles of Arbaminch Zuria District, 4 kebeles were selected by simple random sampling. The sample size was allocated among Kebeles using PPS method and Systematic random sampling was used to select the study house holds.

Data collection

Data collectors were two high school graduates and six extension health workers, who can speak the local language and Amharic .Supervisors, were two sanitarians who were working in the district ITN distribution team. Both the data collectors and supervisors were given three days training on the general objective of the research, how to create a real market situation using roll models and how to fill the questionnaire.

Study variables

Dependent variables

- The community's willingness to pay for insecticide treated bed nets.
- The pattern of utilization of insecticide treated bed nets.

Independent variables

- Socio demographic factors (age, gender, educational status, occupation, family size).
- Economic factors (monthly income, number of livestock, total farm size, household possession of radio, pipe water, etc, type of major household agricultural product).
- Individual factors (knowledge, attitude and practice towards malaria and its prevention particularly ITN, perceived susceptibility and severity of malaria, illness experience, possession of ITN and its source).
- Characteristics of ITNs (color, size, payment scenarios).

Data processing and Analysis

After data collection, each questionnaire was checked visually for completeness. The data was entered using EPI INFO version 6.04 and cleaned and exported to SPSS version 11.0 statistical software packages for analysis. Frequencies and measures of variation were used to describe the study population in relation to socio-demographic and other relevant variables. The strength of association and statistical significance between independent and dependent variables were assessed using crude odds ratio (with 95% confidence interval and P value). Binary logistic regression analysis was performed using SPSS version 11.0 statistical software program to control the potential confounding variables.

Data quality Assurance

The quality of data was assured by properly designing and pre-testing of the questionnaire, proper training of the interviewers and supervisors to avoid hypothetical bias, proper categorization and coding of questionnaires. Furthermore, supervisors and the principal investigator checked the collected data carefully on daily basis for their completeness, accuracy, and clarity

Ethical consideration

Ethical approval was obtained from the Faculty of research and publications committee in AAU. A supporting letter was obtained from the regional and zonal health administrations after a discussion on the significance of the study. Informed oral consent was obtained from every study participant after giving adequate information about the purpose of the study.

RESULTS

I .*Socio-demographic characteristics of the respondents*

The calculated total sample size was 990, and a total of 982 household heads (99%) responded for the questionnaire. Out of these, 533 (54.3%) were male household owners, 400 (40.7%) of them were female household owners. In only 5% of the cases other adult family members were interviewed after repeated trial to get the household owner. As shown in table 1, the mean age of the respondents was 40.8years (SD of 14.3 and Range of 16 – 100 years). The majority of the respondents were married and 64.4% of them were farmers. More than half of the study population can at least read and write. Around 62% of the respondents were Protestants by religion. The average family size per household was 5.9 (SD of 2.6, Range of 1-17).

The average estimated monthly income of the 908 respondents, who were willing to report their income, was 131.9 ETB and the median was 80 ETB. Twenty five percent of the respondents had income less than 50 ETB and 75% earn less than 200 ETB. The average total house hold expenditure was 162 ETB and the median was 110 ETB (SD 159.6 and Range of 10-1752).The first quartile lies at 70 ETB and the third quartile at 184 ETB. Almost three fourth of the families were living in a house with a roof made of corrugated iron sheet and 73% of them had a functional radio. The commonest agricultural products on the area are banana (90.7%), maize (64.7%) and mango (24.6%). The mean amount of banana produced per household was 15.1 kg, (SD of 14, and Range of 1 - 100) the median was 10 Kg. The average amount of maize produced per household was 6.23 Kg (SD of 4.8 and Range of 1 - 50) and its median was 5 Kg.

Table 1: Socio-demographic characteristics of the respondents, Arbaminch Zuria District, March 2006.

Characteristics	Number (%)
Age of the respondents in years(n=982)	
▪ < 25	44 (4.5)
▪ 25-40	554 (56.4)
▪ >40	384 (39.1)
Gender (n=982)	
▪ Female	339 (34.5)
▪ Male	643 (65.5)
Occupation (n=982)	
▪ Farmer	632 (64.4)
▪ Housewife	160 (16.3)
▪ Daily laborer	89 (9.1)
▪ Merchant	22 (2.2)
▪ Student	26 (2.6)
▪ Jobless	22 (2.2)
▪ Government employee	9 (0.9)
▪ Others	22 (2.2)
Marital status (n=982)	
▪ Married	798 (81.3)
▪ Widowed	125 (12.7)
▪ Single	48 (4.9)
▪ Divorced	11 (1.1)
Educational status (n=982)	
▪ Illiterate	439 (44.7)
▪ Can read and write	148 (15.1)
▪ Elementary	201 (20.5)
▪ Secondary	185 (18.8)
▪ College and above	9 (0.9)
Religion (n=982)	
▪ Orthodox	343 (34.9)
▪ Protestant	609 (62)
▪ others	30 (3.1)
Monthly income (n=908)	
▪ <100	127 (14)
▪ 100-500	756 (83.2)
▪ >500	25 (2.8)
Family size (n=982)	
▪ < 4	171 (17.4)
▪ 4-6	516 (52.5)
▪ >6	295 (30)
Roof of the house	
▪ Corrugated sheet	707 (72)
▪ Thatch roof	275 (28)
Possessing Radio	721 (73.4)

II. Knowledge, attitude and practice of the respondents on malaria and insecticide treated bed net

As to the knowledge of the respondents on malaria, as can be seen on Table 2, almost all household heads recognized that malaria is a serious health problem in their village and 76.4% knew that it is transmissible disease. Around 87.6% of the respondents knew that mosquito bites mostly at night. Almost all of them knew at least one symptom of malaria. Most of them 87% mentioned fever as a common symptom, 85.7% mentioned chills and rigors and 39% know loss of appetite as a common symptom.

As to the knowledge on prevention of malaria, 90% of them knew that malaria is a preventable disease and around 93% of them knew at least one method of prevention. The common methods of prevention mentioned were, taking anti malaria medication 56%, environmental sanitation 45% and use of insecticide treated bed net 44.9%. Almost all respondents have heard about ITN and 96% of them believe that it has benefit in preventing malaria, the commonest source of information about ITN being health center 42%, followed by mass media 30%.

Table 2: Malaria and ITN related knowledge and attitude of the respondents, Arbaminch Zuria District, March 2006.

Characteristics	Number (%)
Knows that malaria is transmissible(n=982)	750 (76.4)
Knows that mosquito bites most at night(n=905)	793 (87.6)
Knows that malaria is preventable(n=982)	891 (90.7%)
Common symptoms of malaria mentioned(n=981)	
▪ Fever and headache	858 (87.4)
▪ Chills and rigor	842 (85.8)
▪ Loss of appetite	388 (39.5)
▪ Vomiting	329 (33.5)
▪ Others	31 (31.6)
Knows at least one method of prevention of malaria(n=982)	914 (93.1)
Methods of prevention mentioned (n=914)	
▪ Taking anti malaria medication	555 (60.7)
▪ Environmental sanitation	451 (49.3)
▪ ITN use	441 (48.2)
▪ Smoke	133 (14.6)
▪ Insecticide spray	77 (8.4)
▪ Others	69 (7.5)
Heard about ITN (n=982)	970 (98.8)
Source of information about ITN(n=970)	
▪ Health center	416 (42.8)
▪ Mass media	299 (30.8)
▪ Health extension agents	100 (10.3)
▪ Neighbors or friends	155 (16)
Believe that ITN has benefit (n=982)	944 (96.1)

In 576 (58.7%) of the families, there had been at least one individual who had an illness perceived to be malaria in the past one month. The average medical expense in the previous month before data collection was 35 ETB and median was 14 ETB (SD of 70.2 and Range of 5-700 ETB). As shown on Table (3), among 803 household owners who claim to know the cause of malaria, 91.8% knew that it is due to mosquito bite and 9.4% responded that it is due to contact with malaria patient and others said that it is due to cold exposure, due to hunger and drinking dirty water. There were multiple responses and the percentage will not add up to 100 (Table 3).

Table 3: Presumed causes of malaria by the respondents, Arbaminch Zuria District, march 2006.

Characters	Number (%)
Knows the cause of malaria	803 (81.8)
Presumed causes (n=803)	
▪ Mosquito bite	737 (91.8)
▪ Contact with malaria patient	76 (9.5)
▪ Due to cold exposure	10 (1)
▪ Due to flies	7 (0.9)
▪ Others*	12 (1.4)

* Due to getting hungry, due to maize flower, due to drinking dirty water.

Concerning the practice of the respondents on prevention of malaria, around 76% of the respondents claim to use at least one method of prevention. The common methods mentioned were, use of ITN 40%, environmental sanitation like draining swampy areas 40%, taking anti-malaria tablets 31% and using smoke 12%. Others take herbal medications, close windows and doors and take balanced diet to prevent malaria (Table4)

Table 4: Respondents' current practice on the prevention of malaria, Arbaminch Zuria District, March 2006

Method of prevention	Number (%)
Insecticide treated bed net	400 (40.7)
Environmental sanitation	393 (40)
Smoke	120 (12.2)
Taking tablets	305 (31.1)
Use Nothing	229 (23.3)
Other methods*	30 (5.1)

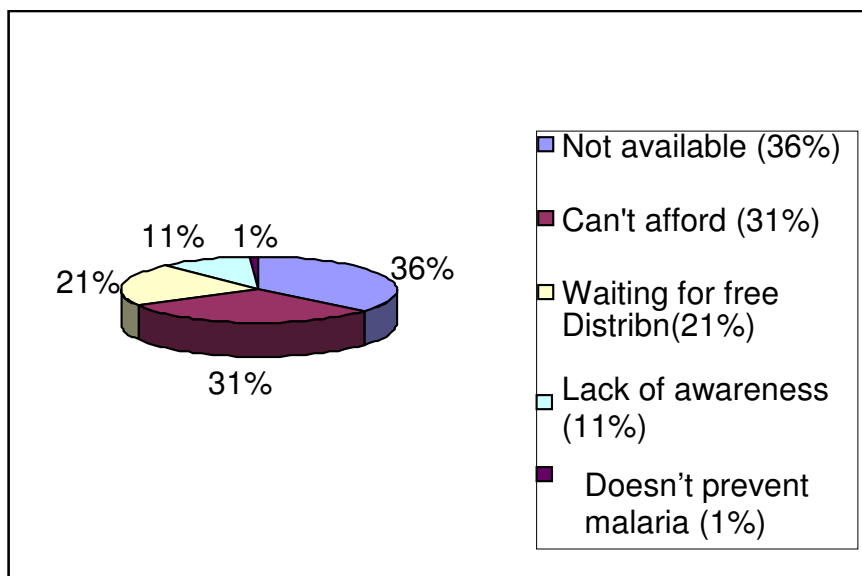
* Taking herbal medications, taking balanced diet, closing windows and doors.

III. Use of insecticide treated bed net and related issues

Out of 982 respondents, a total of 466 (47.5%) households had at least one functional bed net. The mean number of net per household was 0.6 and the mean number of individuals per net was 4.9 for those who possess at least one bed net. One hundred and eighty five (21.8%) of those aged five and under slept under a net the previous night.

The common reasons mentioned for not having ITNs were, unavailability of the bed nets even for sale 186 (36%), can not afford to buy 157 (30.4%) and the lack of awareness about its use 56 (10.9%), about 21% of the respondents did not own ITN because they are waiting for a free distribution (Figure 1).

Figure1: Respondents' reason for not having ITN, Arbaminch Zuria District, March 2006.



As it is shown on Table 5, Out of 466 families who owned ITNs, around 248 (53.2%) obtained their ITN by free distribution and 218 (46.8%) obtained it on payment bases and 198 (90.8%) of the respondents paid 16 - 25 ETB for a single net. Among the respondents who owned ITN, 400(85.7%) of them used it last night and the rest did not.

Almost all the respondents (97.8%) who have ITN(s), treated their net before use, 4 respondents did not know whether their net was treated or not and 35 (7.5%) of respondents claim that their net was long lastingly treated. Almost all respondents obtained their ITN more than 6monthes back, but only 16 (3.5%) of them has retreated it (Table 5).

Table 5: ITN ownership and utilization characteristics, Arbaminch Zuria district, March, 2006.

Characters	Number (%)
Have ITN(s)	466 (47.5)
Number of ITN(s)(n=466)	
▪ ≤2	456 (97.9)
▪ ≥3	10 (2.1)
Source of ITN (n=466)	
▪ Freely distributed	248 (53.2)
▪ Bought	218 (46.8)
Last night use of ITN	400 (85.7)
Ever use of ITN	440 (94.4)
ITN was treated initially	460 (97.8)
ITN was long lastingly treated	35 (7.5)
ITN was retreated	16 (3.5)

The most common reasons for not using the net last night was because it is not suitable to fix the net in 15 (22.7%) of the respondents even though they know how to use it, 11(16.7%) claim that there were no mosquitoes last night, 10 (15%) don't believe that ITN prevents malaria, 13.6% claim that the weather was hot and another 13.6% do not know how to use the nets (Table 6).

Table 6: Reason mentioned by the respondents for not using ITN the previous night, Arbaminch Zuria district, March 2006.

Reasons mentioned(n= 66)	Number (%)
Not suitable to hang the net	15 (22.7)
Don't believe that it prevents	10 (15)
No mosquitoes last night	11 (16.7)
Hot weather	9 (13.6)
Don't know how to use it	9 (13.6)
It is not retreated	3 (4.5)
It was washed	6 (9.1)
Others	3 (4.5)

The commonest reasons for not re-treating bed nets were, re-treatment service is not available, (85%), lack of awareness about its advantage, 59(13.4%) and 2.9% claim that re-treatment service is expensive

IV. Willingness to pay characteristics of the respondents

Among all the respondents, 850(86.5%) were willing to buy ITN if supplied by the market and the rest were not. The common reasons for their unwillingness, among the 132 respondents, were being inability to afford, 54(40.9%) and 39(29.5%) believe that they do not have to buy it, since some people are getting ITN for free, 17% of household owners were unwilling to buy because they do not have confidence in using bed nets (Table 7).

Table 7: Reasons mentioned for unwillingness to pay for ITN, Arbaminch Zuria district, March 2006.

Reasons mentioned(n=132)	Number (%)
Can't afford	54 (40.9)
Has to be free	39 (29.5)
Have no confidence on ITN	23 (17.4)
Have enough ITN	12 (9.1)
I Don't bother for the disease	4 (3.0)

The willingness to pay for three different qualities of ITN was evaluated, out of the 850 household owners who were willing to buy ITN, 407 (47.9%) were willing to buy the blue conical ITN, at price of 30ETB, and out of these 407 respondents, 262 (64.4%) were willing to buy it at 40 ETB. Out of those who were unwilling to buy at 30 ETB, 196 (44.2%) were willing to buy it at 20 (Table 8). The average maximum amount that a person is willing to pay for this ITN was 26.2 ETB and the median was 25 ETB (SD of 13, Range of 5 – 70).

The second type of ITN was the white conical ITN and 400 (47.1%) respondents were willing to buy it at 30 ETB. Out of these 400 household owners, 254 (63.5%) were willing to buy it at 40 ETB and Out of those who refuse to buy it at 30 ETB, 185 (41.1%) were willing to pay 20 (Table 8). The average maximum amount that a person is willing to pay for this ITN was 25.7 ETB and median was 20 ETB (SD of 13, Range of 5 - 70).

The third type of ITN given on the hypothetical market was the blue rectangular ITN. Out of 850 household owners who were willing to buy ITNs, 760 were actually willing to pay for this specific type of ITN for a reason mentioned by most of them being, it has low quality as compared to others. Around 59 % were willing to pay 15 ETB, 231 (51.1%) 20 Birr and 237 (76.9%) a price of 10 Birr (Table 8). The average maximum willing amount was 13.6 Birr and median was 15 Birr (SD of 8.1, Range of 5 – 50 ETB).

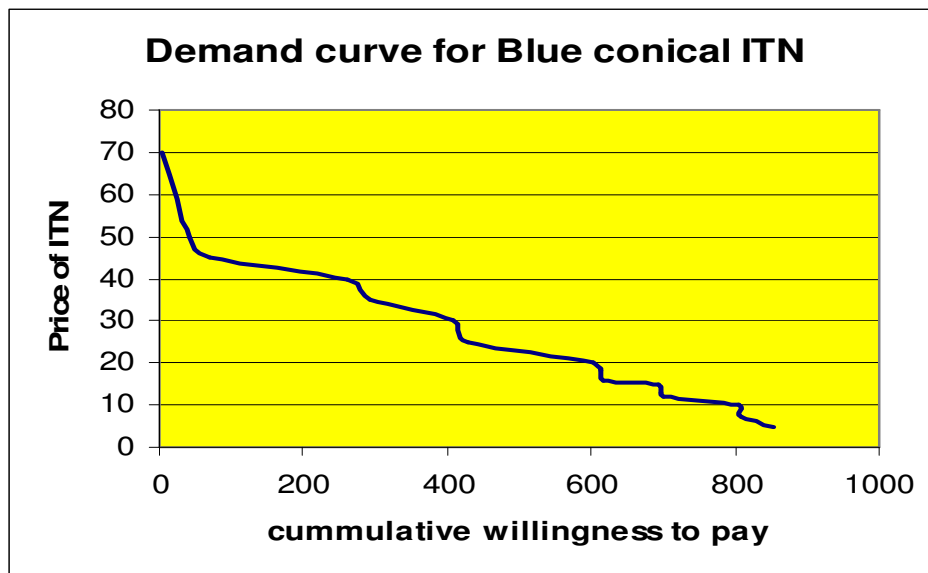
More than three fourth of the household owners were willing to buy also for other family members and the preferred site to buy ITN was 782 (92%) from health institutions. More than half of the respondents were willing to buy ITN around mid year.

Table 8: The Willingness to pay characteristics of the respondents, Arbaminch Zuria District, March 2006.

Characters	Number (%)
Blue circular ITN	
▪ Willing to pay 30 Birr(n= 850)	407 (47.9)
▪ Willing to pay 40 Birr (n= 407)	262 (64.4)
▪ Willing to pay 20 Birr (n= 443)	196 (44.2)
▪ Maximum WTP (n= 850)	
- < 15 Birr	252 (29.6)
- 16-35 Birr	196 (23.1)
- > 35 Birr	402 (47.3)
White circular ITN	
▪ Willing to pay 30 Birr (n=850)	400 (47.1)
▪ Willing to pay 40 Birr (n=400)	254 (63.5)
▪ Willing to pay 20 Birr (n=265)	185 (69.8)
▪ Maximum WTP (n=850)	
- < 15 Birr	252 (29.6)
- 16-35 Birr	196 (23.1)
- > 35 Birr	402 (47.3)
Blue rectangular ITN	
▪ Willing to pay 15 Birr (n=760)	452 (59.5)
▪ Willing to pay 20 Birr (n=452)	231(51.1)
▪ Willing to pay 10 Birr (n= 308)	237 (76.9)
▪ Maximum WTP (n= 760)	
- <= 5 Birr	520 (68.4)
- 6-20 Birr	186 (24.5)
- > 20 Birr	54 (7.1)

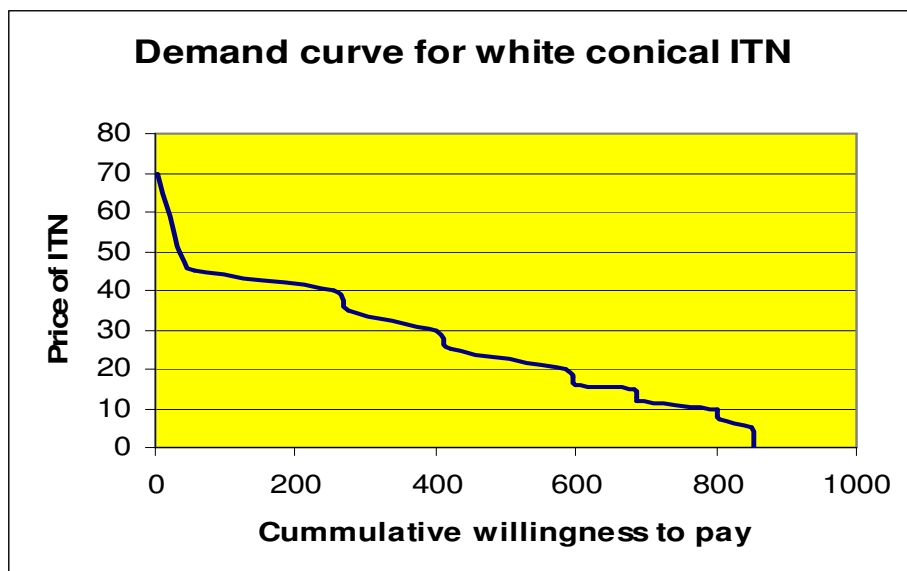
The demand curve using the cumulative maximum WTP for the blue conical ITN is shown on figure 2. Around 25 percent of the values lie below 15 ETB and 75 percent of them below 40ETB. The average maximum WTP was around 26 ETB and the demand rises up to a price of around 40ETB with some fluctuation and starts to drop for price more than that.

Figure 2: Demand curve for the Maximum willingness to pay for a blue conical ITN in Arbaminch Zuria District. March 2006



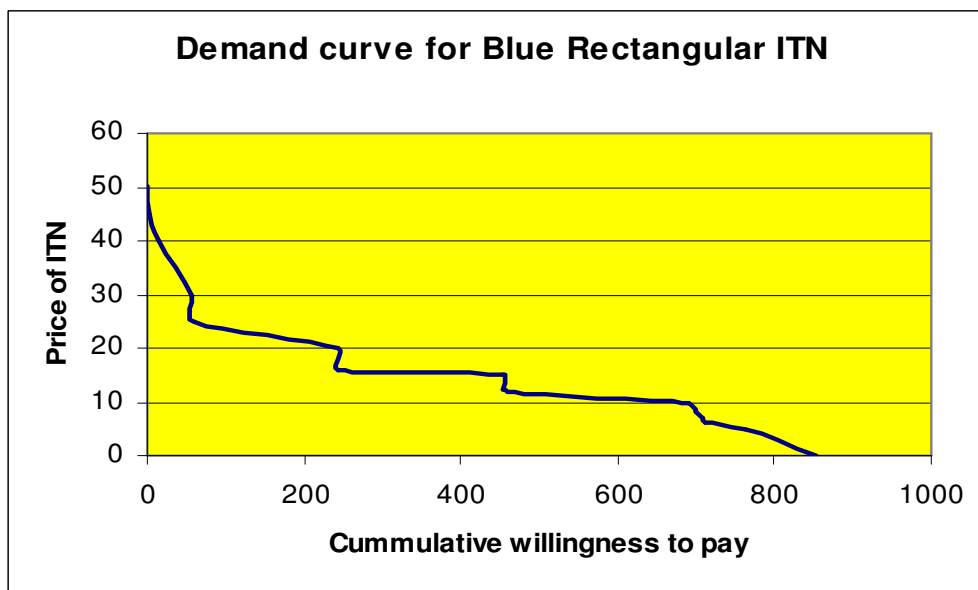
As shown on figure 3, the demand curve of the white conical ITN is more or less the same as that of the blue ITN. Around 25 percent of the values lie below 15 ETB and 75 percent of them below 40ETB. The average maximum WTP was around 25 ETB and the demand rises up to a price of around 40ETB and starts to drop for price more than that.

Figure 3: Demand curve for the Maximum willingness to pay for a white conical ITN in Arbaminch Zuria District, March 2006



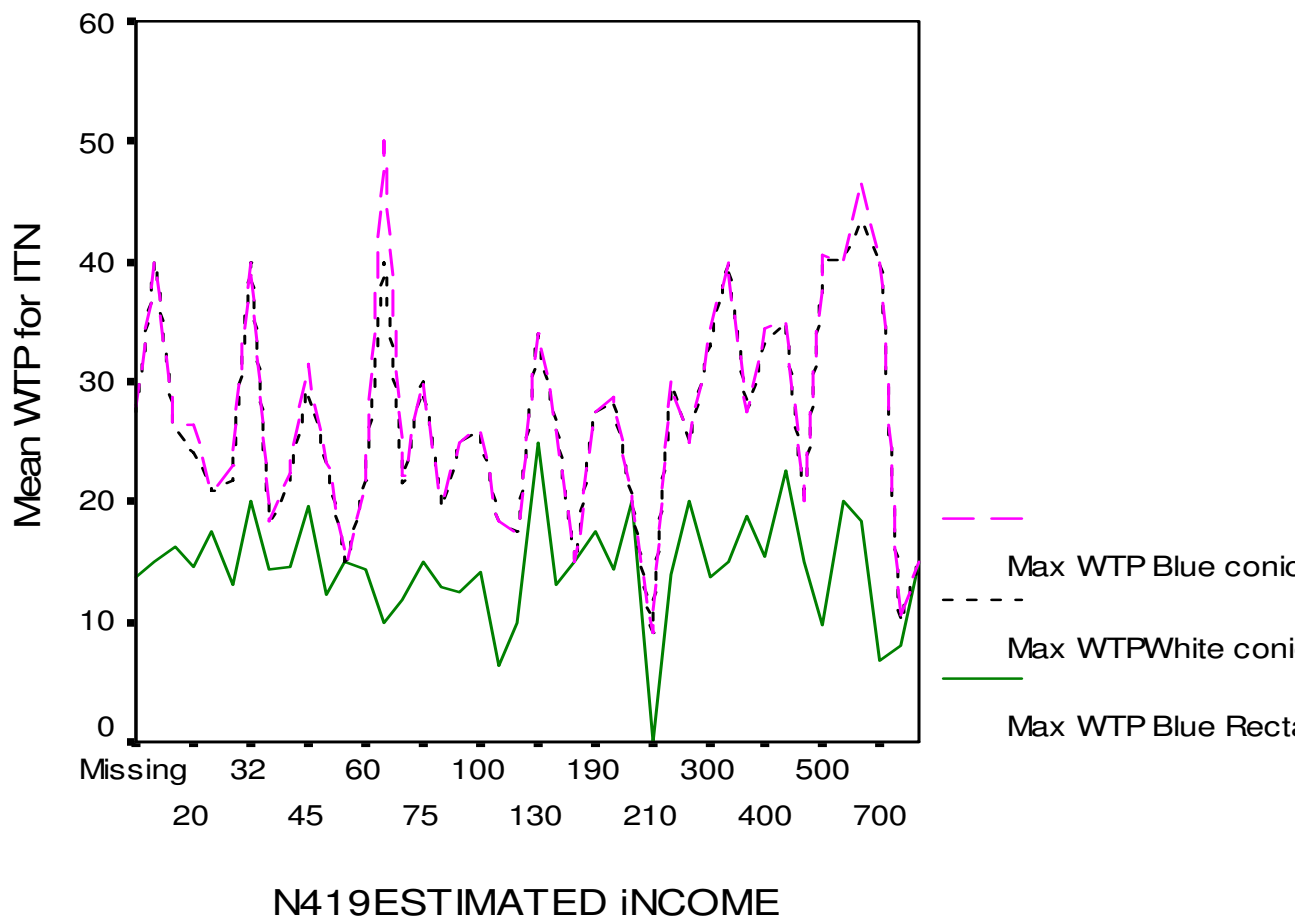
As it is shown on Figure 4, the maximum willingness to pay for the blue rectangular ITN has a different distribution than the conical ITNs. Around 25 percent of the offered prices lie below 10 ETB and 75 percent of them below 20 ETB.

Figure 4: Demand curve for the Maximum willingness to pay for a blue rectangular ITN in Arbaminch Zuria District, March 2006



The figure below shows the mean willingness to pay for the three different qualities of ITN versus estimated income. The maximum willingness does not show a striking increment with a change in income. The graph also shows that the maximum WTP for the blue and white ITNs is almost overlapping on each other but the maximum WTP for the blue rectangular ITN is found way down to the other lines.

Figure 5: Mean willingness to pay for ITN versus estimated monthly income (Income elasticity of WTP) Arbaminch Zuria District, March 2006.



V Factors affecting willingness to pay for insecticide treated bed nets

It was tried to assess which factors are influencing individual's willingness to pay for insecticide treated bed nets. Different socio demographic and malaria related variables were entered in stepwise regression. As can be seen on the (Table 10) below, females were 0.47 times less likely to be willing to pay for ITN than males, this was statistically significant ($p=0.03$) even after controlling possible confounders like educational status, age and income. Educational status of the head of the household was also found to be associated with their willingness to pay. People who can only read and write were almost three times and those who finished elementary school were 3.3 times more likely to be willing to pay than illiterate once. This was statistically significant at p value of 0.000 and 0.014 respectively. The later association was 3.4 times more after controlling for potential confounders.

The monthly income of the respondents was also associated with their WTP. Those respondents with income >100 Birr were almost three times more likely to be willing to pay than those with income < 100 Birr ($p= 0.03$). Individual's willingness to pay was also associated with their farm size holding. As compared to those with no farm land, those with farm size of 0.25- 1.25 hectares were 2.3 times and those with >1.25 hectares of land were 5.3 times more likely to be willing to pay for ITN at P value of 0.02 and 0.005 respectively. This relation was true even after controlling for potential confounders.

Other house hold factors like , people living in a roof of corrugated sheet, those who possess radio, whose family size was greater than six and those who are married were significantly found to be more willing to pay but the association does not persist after controlling for potential confounders like age, educational status and income.

Among those who are ITN owners, the source of their bed net was found to be associated with the current willingness to pay. Those families who obtained their net by purchasing were 3.4 times more likely to be willing to buy again than those who got it for free ($P= 0.000$). The association becomes 2.34 times even after controlling for potential confounders ($P= 0.01$). Those respondents with less than two ITN were 8 times more willing to buy than those with more than two ITNs ($P=0.000$). A significant association was also found with the utilization of ITN. Those who utilized their ITN were about four times more willing to buy than those who did not, even after controlling for potential confounders ($P= 0.001$).

Those people who have good Knowledge on malaria and ITN were 1.76 times more likely to pay for ITN than those who have poor knowledge ($P=0.003$) and those who perceived the benefit of ITN were almost four times more willing to buy than those who didn't ($P= 0.000$), but the association does not persist after controlling for potential confounders.

Table 9: Factors affecting individual's willingness to pay for ITN using Binary logistic regression, Arbaminch Z. district, March 2006.

Variable	Number	Crude OR(CI)	Adjusted OR(CI)
Gender of the respondent			
▪ Female	339	0.47 (0.33,0.69)	0.43 (0.2,0.9)
▪ Male	643	1.00	
Occupation			
▪ Farmer	632	1.00	
▪ Housewife	160	0.55 (0.35,0.88)	
Marital status			
▪ Married	698	1.00	
▪ single	48	0.42 (0.26,0.66)	
Educational status			
▪ Illiterate	439	1.00	3.48 (1.29,9.4)
▪ Can read and write	148	3.1 (1.6,5.9)	
▪ Elementary school	201	3.3 (1.8,5.9)	
▪ Secondary school	185	2.29 (1.34,3.9)	
Family size			
▪ 4-6	516	0.63(0.4,0.9)	
▪ >6	295	1.00	
Monthly income			
▪ < 100 Birr	127	1.00	2.68 (1.3,5.7)
▪ 100- 500 Birr	756	3.13 (1.9,5.2)	
Farm size holding			
▪ No farm land	201	1.00	2.3 (1.1,4.8)
▪ <1.25 Hectare	551		
▪ >= 1.25 Hectare	230	5.62 (2.7,11.5)	
Radio possession			
▪ Yes	721	2.8 (1.9,4.1)	
▪ No	261	1.00	
Roof of the house			
▪ Corrugated sheet	707	1.00	
▪ Thatch roof	270	0.47 (0.32,0.69)	
Knowledge on malaria			
▪ Less knowledgeable	470	1.00	
▪ Knowledgeable	510	1.76 (1.2,2.56)	
Benefit of ITN			
▪ Perceived	944	3.79 (1.9,7.7)	2.01 (1.7,6.9)
▪ Not perceived	38	1.00	
Source of ITN			
▪ Freely given	248	1.00	2.34 (1.1,5.2)
▪ Bought	218	3.4 (1.8,6.4)	
Number of ITN in the house			
▪ 1-2	456	8.5 (2.8,26.2)	48.9 (10.8,221)
▪ >=3	10	1.00	
Last Night use			
▪ Yes	400	4.83 (2.65,8.84)	3.78 (1.78,8.0)
▪ No	66	1.00	

VI. Factors affecting utilization of insecticide treated bed nets

In order to determine what factors influence the utilization of insecticide treated bed nets, several socio demographic and malaria related factors were entered in stepwise regression. As can be seen on(Table 11), those house hold owners with less than 25 years of age utilize ITN, 0.2 times less than those greater than 40 years of age at a p value of 0.007, the relation was the same even after controlling potential confounders like other demographic and economic variables. It was found that males utilize ITN twice than females but this does not persist while controlling confounders. Single and widowed respondents utilize ITN about 0.3 times less than married ones (P= 0.001 and 0.002 respectively). As compared to illiterate ones, those respondents who can read and write, 6 times more (P=0.001) and those who finished secondary school twice more, utilize ITN (P=0.04). Families living in a housing with thatch roof utilize ITN, 0.32 times less than those with corrugated sheet (P=0.000), the association was the same even after controlling for potential confounders.

Respondents' knowledge on malaria and ITN was also found to be significantly associated with utilization of bed nets. Those who had a good knowledgeable on malaria and ITN utilize 3.5 times more than those who were less knowledgeable at a P value of 0.000. This was the same even after controlling for potential confounders like age, sex, educational status and income. Respondents who perceived the benefit of ITN utilized it 12 times more than those who did not (P value of 0.004).The source of ITN was also found to be associated with its utilization, those who obtained the net by purchasing utilized it 1.5 times more than those who got it for free (P= 0.02).

There was a significant association between previous malaria attack and ITN utilization. Those families who had at least one attack of malaria within the last one month utilized ITN 0.4 times less than those with no malaria attack even after controlling for potential confounders ($P= 0.002$).

Table 10: Factors affecting utilization of insecticide treated bed net in Arbaminch Zuria district using Binary logistic regression, March 2006

Variable	Number	Crude OR(CI)	Adjusted OR(CI)
Gender of the respondent			
▪ Female	151	1.00	
▪ Male	316	2.16(1.3,3.7)	
Age of the HH head(yrs)			
▪ <25	14	0.2(0.06,0.66)	0.19(0.04,0.79)
▪ 25-40	269		
▪ >40	184	1.00	
Marital status			
▪ Married	398	1.00	
▪ Single	22	0.28(0.11,0.74)	
▪ Widowed	44	0.32(0.16,0.66)	0.36(0.16,0.8)
Educational status			
▪ Illiterate	181	1.00	
▪ Can read and write	95	6.0(2.1,17.4)	
▪ Elementary school	89		
▪ Secondary school	98	2.1(1.0,4.3)	
Roof of the house			
▪ Corrugated sheet	372	1.00	
▪ Thatch roof	95	0.32(0.19,0.57)	0.46(0.25,0.88)
Knowledge on malaria			
▪ Less knowledgeable	165	1.00	
▪ Knowledgeable*	302	3.5(2.1,5.9)	3.37(1.85,6.14)
Had at least one attack of malaria			
▪ Yes	273	0.39(0.22,0.7)	0.34(0.17,0.66)
▪ No	194	1.00	
Benefit of ITN			
▪ Perceived	461	12.6(2.3,70.4)	7.3(1.1,52.6)
▪ Not perceived	6	1.00	
Source of ITN			
▪ Freely given	248	1.00	1.00
▪ Bought	218	1.92(1.1,3.3)	1.5 (1.2, 5.7)
WTP for ITN			
▪ Yes	405	4.83(2.64,8.8)	3.84(1.9,7.7)
▪ No	62	1.00	

* Respondents who answered correctly more than seven of the thirteen knowledge related questions.

DISCUSSION

This study revealed that 76% of the respondents used at least one method of prevention of malaria. The common methods used being ITN 40%, environmental sanitation 40%, taking anti-malaria drug 31% and smoke 12%. This is more or less comparable with the study done in Jimma Zone, where most common methods used were, environmental sanitation 36%, bed net use 23% and smoke 16% (26).

In this study about 48% of the respondents had at least one functional bed net. The mean number of mosquito net per household was 0.6 and the number of individuals per net was 4.9. This is much lower than the required amount since the average family size was 5.9 and 2 nets per household are required for such a family size. The number of bed nets per household was 0.63 on the study done in Jimma Zone (26), which is more or less the same with the current finding. This figure was lower than the finding in other African countries, where the figure for untreated nets was 0.85 nets per household in addition to 0.25 treated nets per household (27).

The bed net coverage was reported to be 50% on the Jimma survey (26) and 49.8% in Aletawondo district; this is comparable with the finding in this study which is 48%. This figure is much more than the one on preliminary report of EDHS 2005 which is 19.7% (for those living in altitudes less than 1500mm), may be due to the intensive free distribution being done on these sites.

As to the utilization of ITN, among those households who had at least one bed net, 85.7% utilized it the night before the interview but the proportion of under-fives who have slept under a net the

previous night was 21.7%. This figure is lower than the finding in Jimma which was 37.6% and better than the study in Uganda, where only eight percent of children living with their mothers usually sleep under a mosquito net. The explanations given were that children were less likely to use mosquito nets even if available and those who do not share bed with their parents were less likely to do so (28). The latter appears to work for the current study as some of the young children who have younger brothers or sisters did not have the chance to sleep with their parents and under a net. It was also shown that male household owners often utilize bed nets than other family members. This was also observed in other studies where adult men were the group who repeatedly used mosquito nets often followed by mothers with young children and elderly persons (30). Traditionally, adults, by virtue of their age and position as family income earners get priority coverage. The explanation is likely to be economical as well as cultural, as heads are valued and are income generators of the household.

In this study, the cause for not sleeping under a net the previous night was difficulty of hanging the net 22.7%, absence of mosquitoes last night 15% and the rest do not believe that it prevents malaria and a few did not even know what to do with the net. Health beliefs pertaining to transmission of malaria are important for preventive services. Favorable beliefs were important in predicting use of mosquito nets. People who used nets were more likely to believe that malaria is transmitted by mosquitoes and could be cured by modern medicine (28). In this study mosquito bite was incriminated by most respondents as cause of malaria, but contact with malaria patient cold weather and drinking dirty water and poor eating habit were also mentioned as causes. Those people who had a good knowledge on the cause and transmission of malaria were three

times more likely to utilize ITN.

The other important predictor of mosquito net use was individual's perception on the benefit of ITNs. Those who perceived ITN as beneficial were seven times more likely to utilize it. In other studies it was shown that doubting the benefit of ITN, led people to use them to combat nuisance by mosquitoes rather than prevention against malaria. Thus they tend to use nets only when they think that there are mosquitoes. In a study to monitor community responses to malaria control measures in Nigeria, the proportion of people who perceived that mosquito net prevent malaria (22%) was less than those who believe in its prevention against mosquito bite (96%) (31). In a study done to assess malaria prevention by mosquito nets in Burkina Faso, all respondents were interested in future use of treated nets, since they provide protection against mosquito (87%), only minority (3%) stated better protection against illness (32).

The source of bed net was another factor for utilization. In the current study, people who purchased their net were found to utilize it more than those who got it for free. This same effect was observed on the Jimma survey, where those who purchased ITNs were twice more likely to utilize it. In the above mentioned study, distribution efforts were also mentioned as possible contributors to malpractices, like selling nets given for free.

Living condition was also observed as an important factor in using the net. In households where there are many people sleeping in the same room, there is smoke for preventive activity or domestic use, floor which is earth and no bed, use of mosquito nets as a preferable means of malaria prevention is questionable (26). In this study also families living in corrugated iron sheet

house utilized ITNs more than those living in thatched roof.

This study revealed that around 87% of the respondents were willing to buy ITNs, if supplied by the market in a reasonable price. This goes with the study done in Western Shoa where, 99% did not have prior experience of using bed net but 96% of them were willing to pay for ITN and the main reasons for unwillingness were inability to afford and lack of confidence in the bed net. In this same study 81 % of the respondents were willing to pay up to Birr 50 (19). On a survey done by MOH, 40% of the populations were willing to buy ITNs and affordability was one of the determinant factors that impede the possession and use of ITNs. This becomes more severe in areas where the community lacks prior knowledge and culture of using the nets (18).

The common reasons mentioned for unwillingness in the current study, were also un-affordability and expectation of free distribution for all. In the result of logistic regression also, house-hold income was one of the determinants of willingness to pay. The graphical presentation of house hold income versus WTP has shown that there was no striking increment in WTP as income increases; this indirectly shows the magnitude of income elasticity of WTP. A review of contingent valuation studies in Europe has shown that income tends to influence willingness to pay positively and significantly. The elasticity estimates are in most cases greater than zero, but less than unity (33). This was explained by the reason that since health improvement measures tend to be relatively more beneficial to low-income groups, poor people tend to spend as equal amount as those with better economic status to improve their health status. This may also be true in our situation where malaria is mainly affecting the poor.

The higher proportion of WTP in this study is a favorable point for better practice but the expectation of free distribution may signify the development of dependency that may affect future sustainability which is a feared side effect of free distribution if not properly handled.

Another study in Tanzania has tried to look at the role of gender on WTP for ITNs and found that, females were less likely to be willing to pay for ITNs , that have higher price, and more likely to pay for ITNs having lower price as compared to males (17). In the current study also gender was found to be one of the determinant factors for purchasing. Females were less likely to be willing to pay for ITN than males. Other predictors of willingness to pay for ITN were educational status, income of the family, farm size holding and the source of ITN, for those who already possess at least one and the perceived benefit of ITN. This partly goes in harmony with a study in Uganda, where predictors were; ownership of a television, being skilled worker, professional or owning major business and having better health belief (28). In the study in Jimma, independent predictors of purchasing had been possession of a radio, being knowledgeable and occupation of the head (26).

In those families who already had at least one ITN, the source of ITN was also found to be a significant predictor. People who obtained their ITN by purchasing were twice more likely to buy another bed net than those who got it for free.

Those respondents, who perceive the benefit of ITN, were also more likely to be willing to buy it. Thus Favorable health beliefs were important not only in predicting use of mosquito nets but

also people's willingness to buy it.

Apart from individuals' social and economic background, characteristics of an ITN had a great impact on WTP. Even when the same price was charged for ITNs of different attributes (16). This was also observed in the current study, people showed more preference and were more willing to buy the conical type of ITN than the rectangular one. The reason for preference mentioned by most of them was that the rectangular ITN has low quality than the conical ones. Numerous studies have confirmed the common sense notion that quality, as perceived by the consumer, is a major determinant of demand for medical care services. After all it is the perception of high quality that underlies a consumers' perception of value of goods (10). There was no much difference seen on WTP based on the color of ITNs.

Strength of the study

- One of the limitations of contingent valuation studies is the lack of representativeness and in this study maximum sample size was taken to tackle this.
- In order to minimize bias in the contingent valuation the binary with follow-up method was used.

Limitation of the study

- To increase the validity of contingent valuation studies the test-re-test method should be used but due to time and other resource constraints this was not possible to do in this study.
- To validate the data on utilization of insecticide treated bed net, doing house hold observation of the condition of nets would have been better but this was not feasible in this study

Conclusions

- Though the overall bed net coverage of the community seems improved, the average number of bed net per household is still low. Thus the proportion of population who are using effective malaria preventive measures is very low.
- The proportion of under fives who are sleeping under a bed net is still low
- The utilization of bed net is found to be affected by demographic variables, the health belief, perceived benefit of ITN, the source of bed net and the housing condition of the community.
- The community's willingness to pay for ITN is high but there still seems to be a tendency to expect a free distribution for all. This may signify the development of dependency and may result in the decline the already available readiness to purchase if not properly handled.
- The community's willingness to pay is found to be affected by socio-economic factors, perceived benefit of ITN, previous source of bed net and characteristics of the bed net.
- There is low insecticide re-treatment rate of bed nets mainly due to the unavailability of the service.

Recommendations

1. To design proper IEC techniques on malaria to introduce proper health belief, demand and perceived benefit of ITN in the community and to prioritize vulnerable group of the population.
2. Target specific interventions at children under five years and pregnant women through services supported with local training and supervision so as to increase the bed net coverage per household and the proportion of vulnerables who are sleeping under bed net.
3. To utilize the available community's willingness to purchase ITNs on some group of population and to assist the free distribution for those who deserve and to make the supply sustainable. This may also increase the ITN utilization, since free distribution of ITN versus purchased net is found to influence bed net use.
4. Stimulating and facilitating the development of commercial markets, through tax and tariff reduction and competition between manufacturers and distributors must be promoted to ensure that nets are available to the general population at the lowest possible price.
5. To provide the community the type of ITN based on their preference and taking in to consideration the housing condition. The increasing availability of attractive branded qualities of ITN will stimulate its demand and also utilization.
6. To overcome the challenge of low re-treatment rates, either there should be a stronger role for subsidy of insecticide distribution through publicly funded channels or there should be expansion of LLINs .

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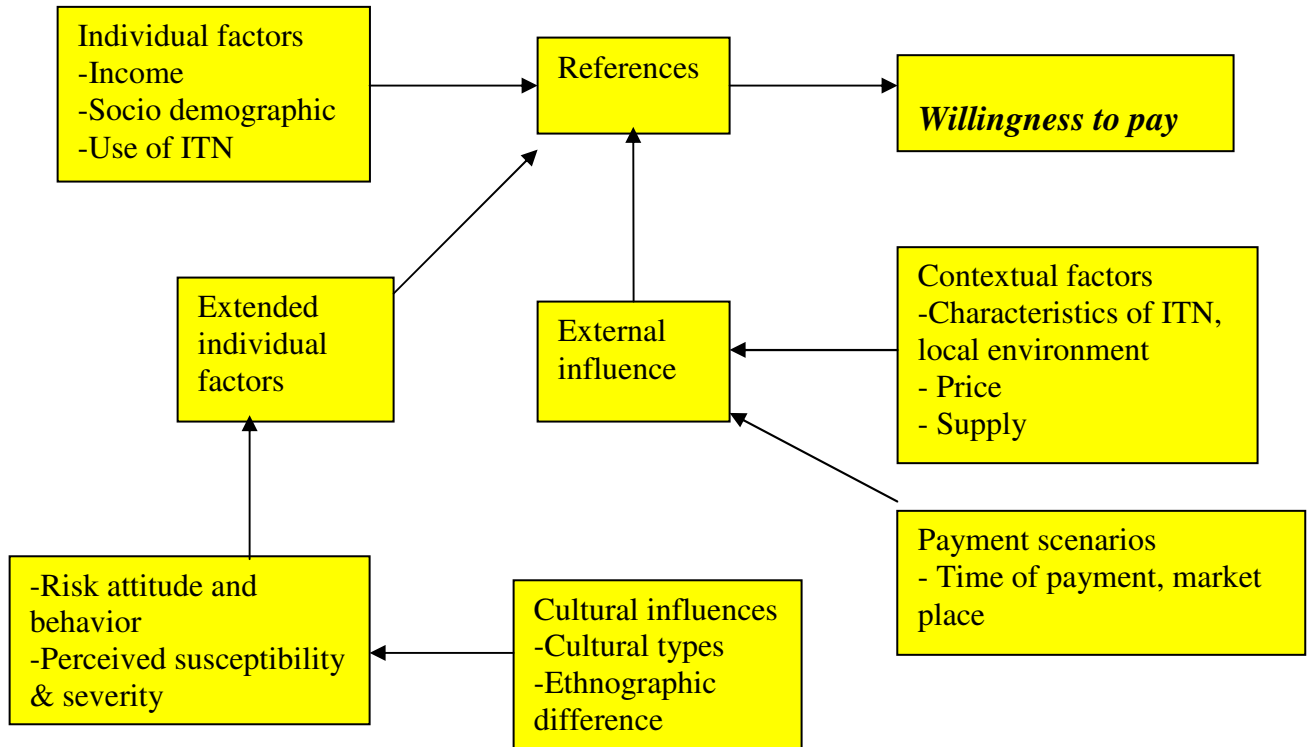
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ANNEXES

Conceptual framework

Conceptual framework of individual's willingness to pay for ITN



Questionnaire (English version)

Questionnaire for a research on willingness to pay for insecticide treated bed net and its utilization in Gammu Gofa zone SNNPR, October 2005

Hello, my name is _____, I am one of the data collectors in this study. The study is intended to assess the utilization and the demand of the community for mosquito net. To attain this purpose, your honest and genuine participation by responding to the questions prepared is very important and highly appreciated.

Confidentiality and consent

We would like you to answer some personal questions. Your answers are completely confidential.. No one will be told what you said in connection to your name. You don't have to answer any question if you do not want to and you can stop the interview at any time.

However your honest answer to these questions will help us to better understand the situation and will contribute to the measures taken to control malaria. We would greatly appreciate your help in participating in this study, would you be willing to participate.

If yes, proceed.

If no, thank and stop here.

(Signature of the interviewer certifying
that respondent has given informed
consent verbally)

Questionnaire for a research on willingness to pay for insecticide treated bed net and its utilization in Gammo Gofa zone SNNPR, October 2005

Interviewer's Name _____
 Supervisor's Name _____
 Date of interview _____
 Questionnaire No _____

A. Respondent characteristics

1. Respondent name: _____	
2. Woreda: _____	
101. Kebele: _____	
102 Age:	<input type="checkbox"/> <input type="checkbox"/>
103 Gender: Female 01 Male 02	<input type="checkbox"/> <input type="checkbox"/>
104 Occupation: Farmer 01 Merchant 02 Govermt employee o3 House wife 04 student 05 Daily labouror 06 Job less 07 Other 08(specify)	<input type="checkbox"/> <input type="checkbox"/>
105 Marital status: Married 01 Single 02 Widowed 03 Divorced 04	<input type="checkbox"/> <input type="checkbox"/>

106. Educational status: (last grade completed)		<input type="checkbox"/>	<input type="checkbox"/>
Illiterate 01			
Can read and write 02			
Elementary 03			
Secondary 04			
College and above 05			
107 Status of the respondant : Husband 01		<input type="checkbox"/>	<input type="checkbox"/>
Wife 02			
Other 03(specify)			
108. Religion of the head of the household:		<input type="checkbox"/>	<input type="checkbox"/>
Orthodox 01			
Protestant 02			
Catholic 03			
Muslim 04			
Other 05			
109 Total number of family members:			
Female_____ Male_____ : under- five years of age			
Female_____ Male_____ more than five years of age			

B. Malaria and ITN related questions

Ser. No	Questions	Response categories	Code
301	Is malaria a health problem in your village?	01Yes 02No 03I don't know	
302	Has any one in your household had malaria during the past one month?	01. Yes 02. No	If 02, Skip to 4
	If yes,	Male____ Female____(< 5 yrs) Male____ Female____(>=5yrs)	
303	Has any one in your household died of malaria in the last 12 months?	01yes 02No	
304	Is malaria transmissible disease	01Yes 02No 03I don't know	If 02, 03 Skip to7
305	How is malaria transmitted from one person to another person? (more than one response is possible)	01.Through contact with a malaria patient 02 By flies 03 Through mosquito bite 04. Due to cold 05. I don't know 06 Other(specify)	
306	When do mosquitoes bite most?	01 Day time only 02 Night time 03 Day and night 04 I don't know	
307	Is malaria a preventable disease?	01. Yes 02. No 03 I don't know	
308	What symptoms of malaria do youknow? (more than one response is possible)	01. Fever, headache 02. chills, rigors 03. loss of appetite 04. vomiting 05. I don't know	

309	What kind of method do you know to prevent malaria?	01. Taking tablets 02. Household spray 03. Environmental sanitation like draining swampy areas 04. Using mosquito net 05. No one smoke	
319	How many family members have ever slept under a bed net? (more than one response is possible)	06. Over 5 years (so of wife) 07. The weather is hot	
320	If none to Q 19 & (or)21, why? (more than one response is possible)	08. There are no mosquitoes 09. I don't know	
310	What method(s) do you and your family use to prevent malaria? (more than one response is possible)	01. Taking tablets 02. Household spray 03. Environmental sanitation like draining swampy areas 04. Other	
321	Was the net treated with an insecticide while you obtained it?	01. Yes 02. No 03. I don't know	
322	Was the net long lastingly treated	01. Yes 02. No 03. I don't know	If
311	Do you(your family) have a functional insecticide treated bed net?	01. Yes 02. No 03. I don't know 04. Other	If 03, 04 Skip to 26
323	If not and if it has been >6 months since you obtained it, have you retreated it with insecticide?	01. Yes 02. No 03. I don't know	If 01
312	Have you ever heard about insecticide treated bed nets?	01. Yes 02. No 03. I don't know	Skip to 26
313	If the net was retreated > 6 months back, why didn't you retreat it?	01. Retreatment is expensive 02. No 03. Service is not available 04. Health institution 05. The insecticide is dangerous 06. The insecticide has no value 07. Don't know the benefit of retreatmnet	If 02, Skip to 16
314	From where did you get the insecticide? (more than one response is possible)	01. Health institution 02. The insecticide is dangerous 03. The insecticide has no value 04. Don't know the benefit of retreatmnet	
325	Did you wash the bed net in the last six months period?	01. Yes 02. No	

318	How many family members slept under a bed net last night?	1 < 5 yrs of age____ 2.pregnanat mothers____ 3.Other family members____ 4.No one	
-----	---	---	--

C)Ability and willingness to pay characteristics

Malaria is a major public health problem in Ethiopia. Government resource and effort alone could not guarantee the prevention and control of the disease. Hence community involvement in these activities has become very crucial.

One most effective means of preventing malaria infection is found to be the use of insecticide impregnated bed nets. The bed nets have proved in reducing malaria morbidity and mortality in many parts of the world. Based on the above understanding I will ask you some questions and I will ask your cooperation.

Ser. No	Questions	Response categories	Codes
401	Do you want to use an insecticide treated bed net?	01. Yes 02. No	
402	If bed nets are provided by the market, are you willing to buy it?	01 Yes 02 No	If 01,Skip to 4
403	If no, why? (more than one response is possible)	01.I have no confidence in it 02.I can't afford to buy it 03 I don't bother much for the disease 04. Others (specify)	

404	Suppose your income remains the same, would you buy this blue medium sized circular ITN at 30 Birr?	01.Yes 02.No	If 02, Skip to 4.2
405	If yes, what if the price is 40, will you buy it?	01.Yes 02.No	
406	If no, what if the price is 20, will you buy it?	01.Yes	
407	What is the maximum amount that you are willing to pay for this ITN in Birr?_____	02. No	

408	Suppose your income remains the same, would you buy this white medium sized circular ITN at 30 Birr?	01.Yes 02.No	If 02, Skip to 5.2
409	If yes, what if the price is 40, will you buy it?	01.Yes 02.No	
410	If no, what if the price is 20, will you buy it?	01.Yes	
411	What is the maximum amount that you are willing to pay for this ITN in Birr?_____	02.No	
412	Suppose your income remains the same, would you buy this blue medium sized rectangular ITN at 15 Birr?	01.Yes 02.No	If 02, Skip to 6.2
413	If yes, what if the price is 20, will you buy it?	01.Yes 02.No	
414	If no, what if the price is 10, will you buy it?	01.Yes	
415	What is the maximum amount that you are willing to pay for this ITN in Birr?_____	02.No	
416	Will you be willing to pay for other house holds in the family?	01.Yes 02.No	

417	If you are willing to buy, from where do you prefer to buy ITN?	01.Health center 02.Kebele 03.Public shops 04. Others	
418	At which time of the year do you prefer to buy the net?	01 beginning of the year 02 middle of the year 03 End of the year	
419	How much is your family estimated monthly income in Birr?		
420	Does your household have? .A functional radio	Yes 01 No 02	
421	.Electricity	Yes 01 No 02	
422	.Piped water	Yes 01 No 02	
423	.Telephone	Yes 01 No 02	
424	.Television	Yes 01 No 02	
425	What is the type of roof of the house?	01.Corrugated sheet 02.Thatch roof 03.Other	
426	How many livestock do you own?	01.Oxen____ 02.Cows____ 03. Donkeys____	
427	What is the total farm size holding of the household in Hectars?		
428	What is the major household agricultural product (more than one response is possible)?	01.Bannana 02. Maize 03. Sorghum 04.Teff 05. mango 06. Others(specify)	
429	How much did you produce(KG) for the three major products last year	1.----- 2.----- 3. -----	

430	How much did you spent last month for the following major household consumptions?	1 medical service----- 2. Fuel----- 3. Food----- 4. Electric----- 5. School fee----- 6 House rent----- 7. Other major expense-----	
-----	---	--	--

Thank you for the information you gave us!!!

Questionnaire (Amharic Version)

በአዲስ አበባ ዩ.ቲ.ሲ. የህብረተሰብ ጤና ትምህርት ክፍል

በደቡብ ብሔር ብሔረሰቦችና ሕዝቦች ክልል በጋሞ ጎፋ ዞን በፀረ ተባይ መድሃኒት የተነከረ የአልጋ አጎበር የመግዛት (የመክፈል) ፈቃደኝነት ..

የአጠቃቀም ሁኔታ መጠይቅ

ሕዳር / 1998 ዓ.ም.

ጤና ይስጥልኝ ስሜ _____ ይባላል። ለዚህ ጥናት መረጃ ሰብሳቢ ነኝ። ይህ ጥናት ሕብረተሰቡ የወጣ ትንኝ መከላከያ ለአልጋ አጎበር ያለውን ፍላጎትና አጠቃቀም እንዲሁም በወጣ በሽታ ዙሪያ ያለውን ግንዛቤ ለማወቅ የተዘጋጀ ነው። የ.ርስዎ ቀና ተሳታፊነትና ለጥያቄዎችን ምላሽ ስጠት በጣም አስፈላጊ .. ከፍተኛ ጠቀሜታ አለው።

የሚስጥር አጠባበቅና የተጠያቂውን ስምምነት ማረጋገጫ

በዚህ ጥናት የእርስዎን አንዳንድ ግለሰባዊ ጉዳዮች የሚመለከቱ ጥያቄዎች ሊጠቀሙ ይችላሉ። የሚሠጡን ምላሽ ግን ፍጹም በእኔና በ.ርሶዎ መካከል የሚቀር ሲሆን ከእርስዎ ስም ተዛማጅነት ባለው መልኩ ለማንም አይነገርም። ማንኛውንም ምላሽ ለ.ስጠት የማይፈልጉትን ጥያቄ አለመመለስ ይችላሉ። ቃለ ምልልሱንም በፈለጉ ጊዜ ሊያስቆጡ ይችላሉ። የ.ርስዎ እውነተኛ ምላሽ ያለውን ሁኔታ በትክክል እንድንረዳ ያስችላል። ብሎም በቀጣይነት ለሚደረጉ የወጣ ቁጥጥር ስራዎች ላይ ዕገ ያደርጋል። በቅድያ ለጥናቱ ምላሽ ለመስጠት ቃደኛ ቢሆኑ እናመሰግናለን ።

በጥናቱ ለማሳተፍ ፈቃደኛ ነዎት? አዎ → ይቀጥሉ
አይደለሁም → አመሰግነው ያቁሙ

መረጃ ሰብሳቢው የተጠቀሙትን ፍቃድ መጠየቁንና ማግኘቱን ወይም አለማግኘቱን የሚያረጋግጥ ፊርማ _____
ቀን _____

የመረጃ ሰብሳቢው ስም _____

የተቆጣጣሪው ስም _____
 ... የተሰበሰበበት ቀን _____
 የመጠይቅ ቁጥር _____

ሀ.
አጠቃላይ
መረጃ

1. ስም	_____		
2. ወረዳ	_____		
3. ቀበሌ	_____		
4. የቤት ቁ.	_____		
5. ዕድራ		<input type="checkbox"/>	<input type="checkbox"/>
6. ዓታ ወንድ 02	ሴት 01	<input type="checkbox"/>	<input type="checkbox"/>
7. ግራ ገበሬ	01	<input type="checkbox"/>	<input type="checkbox"/>
ነጋዴ	02		
የመንግስት ሰራተኛ	03		
የቤት እመቤት	04		
ተማሪ	05		
የቀን ሰራተኛ	06		
ስራ አጥ	07		
ሌላ (ይጥቀሱ) 08	_____		
8. የጋብቻ ሁኔታ ያገባ	01	<input type="checkbox"/>	<input type="checkbox"/>
ያላገባ	02		
ሚስት(ባል)የሞተ ጋብቻ(ባት)	03		
የፈታ	04		
9. የትምህርት ደረጃ (ያጠናቀቀው የት/ደረጃ)		<input type="checkbox"/>	<input type="checkbox"/>
ያልተማረ	01	<input type="checkbox"/>	<input type="checkbox"/>
ማንበብ መጻፍ የሚችል	02		
አንዳኛ ደረጃ	03		
ሁለተኛ ደረጃ	04		
ኮሌጅና ከ...ያ በላይ	05		
10. ተጠያቂው ቤተሰቡ .. ያለው ግንኙነት ባል	01	<input type="checkbox"/>	<input type="checkbox"/>
ሚስት	02		
ሌላ (ጥቅስ)	03 _____		

11. የቤተሰብ ኃላፊው ሃይማኖት ሁኔታ	ኦርቶዶክስ	01	<input type="checkbox"/>	<input type="checkbox"/>
	ኘሮቴስታንት	02		
	ካቶሊክ	03		
	ሙስሊም	04		
	ሌላ	05	_____	
12. ጠቅላላ የቤተሰብ አባላት ብዛት				
	ሴት _____ ወንድ _____	ከ5 በታች		
	ሴት _____ ወንድ _____	ከ5 በላይ		

. ከወባ በሽታ ጋር ተያያዥነት ያላቸው መጠይቆች

1. በአካባቢዎ የወባ በሽታ የጤና ችግር ነው?

አዎ 01

አይ 02

አላውቀም 03

1. በፀረ ተባይ መድሃኒት የተነከረ አጎበር መጠቀም ይፈልጋሉ?

አዎ 01

አይ 02

2. በፀረ ተባይ መድሃኒት የተነከረ አጎበር ገበያ ላይ ተቀምጦ ለመግዛት ፍቃደኛ ነዎት?

አዎ 01

አይ 02

መ. የመግዛት አቅም ና ፍላጎትን የተመለከተ መረጃ

የወባ በሽታ በአገራችን

ን ዳይ ከሚባሉት የጤና ችግሮች አንዱ ነው። የመንጠል ጥረት ብቻውን በበቂ ሁኔታ ወባን ለመቆጣጠርና ለመከላከል አያስችልም። ስለሆነም የህብረተሰብ ተሳትፎ እጅግ በጣም አስፈላጊ ነው። አንዱ ። ።ኛው የወባ መከላከያ ዘዴ በፀረ ተባይ መድሃኒት የተነከረ አጎበር መጠቀም ነው። የአልጋ አጎበር በመጠቀም በወባ ምክንያት የሚደርሰውን ህመምና ሞት እንደሚቀንስ ተረጋግጧል። ከላይ በሰጠህት መረጃ መረት የሚቀጥሉትን ጥያቄዎች በመመለስ እንዲተባበሩን እጠይቃለሁ።

3. አይ ካሉ ለምን?

አጎበር በመጠቀም ስለማልተማመን 01

ለመግዛት አቅም ስለሌለኝ 02

ስለበሽታዬ ብዙም ስለማልጨነቅ 03

ሌላ (ጥቀስ) 04 _____

4. እንበልና የወር ገቢዎ አሁን ባለበት መጠን ቢቀጥል ይሄንን (ሰማያዊ ክብ መካከለኛ መጠን አጎበር) በ30 ብር ይገዛሉ?

አዎ 01

አይ 02

አዎ ካሉ ዋጋው 40 ብር ቢሆንስ ግዛሉ?

አዎ 01

አይ 02

አይ ካሉ ዋጋው 20 ብር ቢሆንስ ?

አዎ 01

አይ 02

ለዚህ በፀረ ተባይ መድሃኒት ለተነከረ አጎበር ለመክፈል ቃደኛ የሚሆ. .

ከፍተኛ ዎጋ ስንት ነው (ብር) _____

5. እንበልና የወር ገቢዎ አሁን ባለበት መጠን ቢቀጥል ይሄንን (ነጭ ክብ መካከለኛ መጠን አጎበር በ30 ብር ይገዛሉ

አዎ 01

አይ 02

አዎ ካሉ ዋጋው 40 ብር ቢሆንስ ይገዛሉ?

አዎ 01

አይ 02

አይ ካሉ ዋጋው 20 ብር ቢሆንስ ይገዛሉ?

አዎ 01

አይ 02

ለዚህ በፀረ ተባይ መድሃኒት ለተነከረ አጎበር ለመክፈል ቃደኛ የሚሆኑት ከፍተኛ

ዎጋ ስንት ብር ነው _____

6. እንበልና የወር ገቢዎ አሁን ባለበት መጠን ቢቀጥል ይህ. . ሰማያዊ አነስተኛ መጠን አጎበር በ15 ብር ይገዛ?

አዎ 01

አይ 02

አዎ ካሉ ጋወ 20 ብር ቢሆንስ ይገዛሉ?

አዎ 01

አይ 02

አይ ካሉ ጋወ 10 ብር ቢሆንስ ይገዛሉ?

አዎ 01

አይ 02

ለዚህ በፀረ ተባይ መድሃኒት ለተነከረ አጎበሩ ለመ... ቃደኛ የሚሆኑት ከፍተኛ ዎጋ ስንት ብር ነው _____

7. ለሌሎች የቤተሰብ አባላት ለመግዛት ቃደኛ ነዎት?

አዎ 01

አይ 02

8. የሚገዙ ከሆነ በፀረ ተባይ መድሃኒት የተነከረ አጎበሩን ከየት መግዛት ይመርጣሉ?

ከጤና ጣቢያ 01

ከቀበሌ 02

ከማንኛውም ሱቅ 03

ሌላ (ጥቀስ) 04 _____

9. የሚገዙ ከሆነ በአመቱ ውስጥ በየትኛው ጊዜ አጎበሩን መግዛት ይመርጣሉ?

በአመት መጀመሪያ ላይ 01

በአመት አጋማሽ 02

በአመት መጨረሻ 03

10. የቤተሰብዎ ጠቅላላ የወር ገቢ በግምት ምን ያህል ይ...ል?

11. ከሚከተሉት ውስጥ በቤትዎ የትኛው ይገኛል? (የሚመለከተውን ሁሉ ያክብቡ)

አለ የለም

የሚሠራ ሬድዬ 01

የኤሌክትሪክ አገልግሎት 02

የቧንቧ ወሃ 03

የስልክ አገልግሎት 04

ቴሌቪዥን 05

12. የቤትዎ ጣሪያ ክዳን ምን አይነት ነው? ቆርቆሮ 01

ሳር 02

ሌላ 03 _____

13. ስንት የቤት እንስሳ አሉዎት? በሬ _____
 ላም _____
 አህያ _____
 ሌላ(ጥቀስ) _____

14. ጠቅላላ የቤተሰቡ የመሬት ይዘታ መጠን ምን ያህል ነው?(የሚመቸውን መለኪያ በመጠቀም) ጥማድ _____
 ማሳ _____
 ሄክታር _____
 ሌላ (ጥቀስ) _____

15. ቤተሰቡ በዋናነት የሚያመርታቸው የግብርና ወጤት የትኞቹን ነው?(ሁሉንም ይጥቀሱ)

- ሙዝ 01
- በቆሎ 02
- ገብስ 03
- ጤፍ 04
- ስንዴ 05
- ሌላ(ጥቀስ) 06 _____

16. ከሶስቱ ዋና የምርት አይነቶች ባለፈው አመት ምን ያህል አመረቱ? (በኪ.ግራም)

1. _____
2. _____
3. _____

17. ባለፈው ወር ለሚከተሉት የቤት ፍጆታዎች ምን ያህል ብር አወጡ?

1. ህክምና _____
2. ነዳጅ _____
3. ምግብ _____
4. ኤሌክትሪክ _____
5. የቤት ኪራይ _____
6. የት/ቤት ክፍያ _____
7. ሌላ (ጥቀስ) _____