PREVALENCE AND RISK FACTORS FOR MALARIA AND TRACHOMA IN ETHIOPIA

A HOUSEHOLD CLUSTER SURVEY OF

1) MALARIA PREVALENCE AND RISK FACTORS IN AMHARA, OROMIA AND SOUTHERN NATIONS, NATIONALITIES AND PEOPLES' REGIONS;

2) TRACHOMA PREVALENCE AND RISK FACTORS IN AMHARA REGION.

August, 2007

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Acronyms

CDTI	community-directed treatment with ivermectin
CO	corneal opacity
CSPro	Census and Survey Processing System
EC	Ethiopian calendar
FMOH	Federal Ministry of Health
GC	Gregorian calendar
GFATM	Global Fund for AIDS, TB and Malaria
GPS	global positioning system
HH	household
LLIN	long-lasting insecticidal net
MERG	Monitoring and Evaluation Research Group
Pf	*Plasmodium falciparum*
Pv	*Plasmodium vivax*
RDT	rapid diagnostic test
SNNPR	Southern Nations, Nationalities and People's Region
TCC	The Carter Center
TF	trachomatous inflammation-follicular
TI	trachomatous inflammation-intense
TS	trachomatous scarring
TT	trachomatous trichiasis

Acknowledgements

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Summary

A household cluster survey was conducted in Amhara, Oromia and Southern Nations, Nationalities and Peoples' (SNNP) regions of Ethiopia during December 2006 to January 2007, during the end of the malaria season. The purpose was to obtain baseline information before large scale distribution of long-lasting insecticidal nets (LLINs) in early- to mid 2007 and implementation of other integrated programs for prevention of malaria, trachoma and onchocerciasis. The objectives of the survey were:

1) Assess the risk of malaria and trachoma through the collection of household level baseline data for malaria and trachoma risk indicators, including: housing construction, markers of socio-economic status, availability of latrines and water, altitude, coverage of spraying and use of nets.
2) Determine baseline coverage of LLINs, untreated mosquito nets and indoor residual spraying.
3) Determine the prevalence of malaria in all age groups through a malaria parasite prevalence survey.
4) Determine the prevalence of trachoma in all age groups in Amhara region, including the prevalence of trichiasis and the need for surgeries.

A total of 224 clusters of average 25 households each (total 5,708 households) were selected and 28,994 individuals participated in at least one part of the survey. Sampling was designed to give zonal level estimates in Amhara. In Oromia and SNNPR, the regions were divided into 'quadrants' comprising several zones for sampling, with one quadrant in each region covering the onchocerciasis program areas of The Carter Center. The sampled population was generally representative of the age distribution seen in the overall population, although there were fewer than expected individuals sampled in the children under-five and male 20-40 years age groups, and an excess of women aged 20-40 years. The survey was based on the WHO/Monitoring and Evaluation Research Group (MERG) Malaria Indicator Survey household questionnaire, modified for local conditions and with malaria and trachoma prevalence sections added. One town (Bahir Dar) and 14 woredas (two in Amhara, eight in Oromia and four in SNNPR) were excluded from sampling because of low malaria risk.

Response rates in the survey depended on the indicator being sampled. For household risk factors, net ownership and net use, the participation rate was 97% in Amhara and 98% in Oromia/SNNPR. Malaria slides were available and readable for 85% (Amhara) and 82% (Oromia/SNNPR) of eligible persons. In Amhara, 88% of those eligible had a trachoma eye examination.

The main source of drinking water was 'unsafe' (i.e. unprotected springs or wells, or surface water) for 66.1% of households, and 28.7% had to travel more than 30 minutes to get water. Overall, 73.6% of households had no access to a latrine of any kind. House construction was typically of wood or sticks (91.4%), and floors were mainly earth (76.1%). Roofs were mainly made of thatch in Amhara (57.1%), but of corrugated iron in the other regions (67.0% and 75.1%

in Oromia and SNNPR respectively). Less than 5% of households had electricity and less than 2% had a television, while 27.3% had a working radio.

Malaria blood slides were examined from 11,601 people. Rapid diagnostic tests were also done to ensure immediate treatment. The overall prevalence of a positive blood slide (any species) was 4.1% (95% CI 3.4 to 4.9). The highest prevalence of 5.4% was in SNNPR, followed by Amhara at 4.6%, with lowest prevalence of 0.9% in Oromia. By species, 57% of infections were due to *P.falciparum*.

Positive malaria slides were found in all zones of Amhara region, ranging from 2.4% in Oromia zone to 6.1% in South Gondar. Similarly, positives were seen in all quadrants of Oromia and SNNPR except one. In Oromia region, prevalence ranged from 0% in quadrant D (south and central Oromia) to1.9% in quadrant C (east Oromia). In SNNPR, there was a much greater range from 1.1% in quadrant B (south and southwest SNNPR) to 9.9% in quadrant D (central SNNPR).

There was no significant difference in malaria prevalence (for either species or overall) by gender or age group. The age-specific prevalence was 4.6% in children under five years; 4.2% in 5-14 year olds; 3.8% in 15-49 year olds and 4.4% in those aged 50 and over.

The majority of the sampled households (93.4%) were situated between 1000 and 2500 meters in altitude. Only in Amhara were there households at <=1000m (1.1% of 11,601 households) or at >2500m (5.6%). There was a declining trend in malaria prevalence from 7.3% at <1000m to 3.2% between 2500 and 3000m. There was a cluster of cases in one household at >3000m which raised the prevalence in that group to 7.3%.

It was estimated that 37.0% (95% CI 31.1-43.3) of households possessed at least one net. The maximum number of nets owned was 5 and the median was 0. Only 19.6% (95% CI 15.5-24.5) owned at least one LLIN. The mean number of nets of any type was 0.6 (95% CI 0.5-0.7) per household and of LLIN 0.3 (95% CI 0.2-0.4) per household.

Overall, 27.8% (95% CI 23.5 – 32.7) of people of all ages slept under a net the previous night and 15.3% (95% CI 12.0-19.2) slept under an LLIN. The proportions were slightly higher for under-five-year-olds (31.8% net and 17.4% LLIN) and pregnant women (35.9% net; 18.9% LLIN). There was no difference in net use by gender. The proportion of houses sprayed within the last 6 months was 5.7% and within the last 12 months was 15.5%.

In Amhara, trachoma prevalence (trachomatous inflammation-follicular [WHO grade TF] in children aged 1-9 years) ranged from 12.6% to 60.1% by zone, with the overall state-wide prevalence being 32.7% (95% CI: 29.2–36.5%). State-wide prevalence of trachomatous trichiasis (TT) in persons aged over 15 years was 6.2% (95% CI: 5.3–7.4), and it was 0.3% (95% CI: 0.2–0.5) in children aged 0-14 years. Overall, an estimated 643,904 persons (lower bound 419,274, upper bound 975,635) have TT and require immediate corrective surgery.

The results obtained will help to guide and evaluate future integrated malaria, trachoma and onchocerciasis prevention and control activities.

Introduction

Background

The Carter Center is currently working in Ethiopia on two integrated disease control projects: malaria and onchocerciasis (MALONCHO); and malaria and trachoma (MALTRA). In addition the Center assists with guinea worm surveillance and supports the Ethiopia Public Health Training Initiative, which is providing materials and support to improve the skills of the health workforce.

The Carter Center (TCC) has committed itself to the provision of 3 million long-lasting insecticidal nets to complete the country's requirement of 20 million by September 2007. In addition to purchase and procurement of the requested nets, TCC is also helping to distribute them within and outside its current areas of operation in the Regions of Amhara, Oromia and the Southern Nations and Nationalities Peoples Region (SNNPR). In order for TCC to assist the MOH in the assessment and evaluation of its malaria control, we needed to conduct a baseline household survey of net coverage and use as well as malaria prevalence within these three regions. Because TCC is working to prevent and control trachoma in Amhara region through the MALTRA project, the survey was also designed to assess the prevalence of trachoma signs in the region, prior to large expansion of the trachoma activities.

In the household cluster survey described here, interviews were conducted in 5,708 households located in 224 clusters regarding the risk indicators for malaria and trachoma, and the use and access to the protective measures of net use, indoor residual spraying, latrines, and access to water. Additionally, 11,601 randomly selected individuals provided blood samples for both rapid diagnostic test (RDT) and microscopy analysis of the prevalence of malaria infection in these three regions. In Amhara region, 17,242 people had eye examinations for trachoma.

The baseline survey described here will give TCC and the FMOH the needed information by which to mark progress in goals made to control malaria and trachoma. We will assess the remaining need for trachoma surgeries and for nets, as well as help to maximize future efforts to control the diseases.

Objectives

The baseline survey was designed to meet the following objectives:

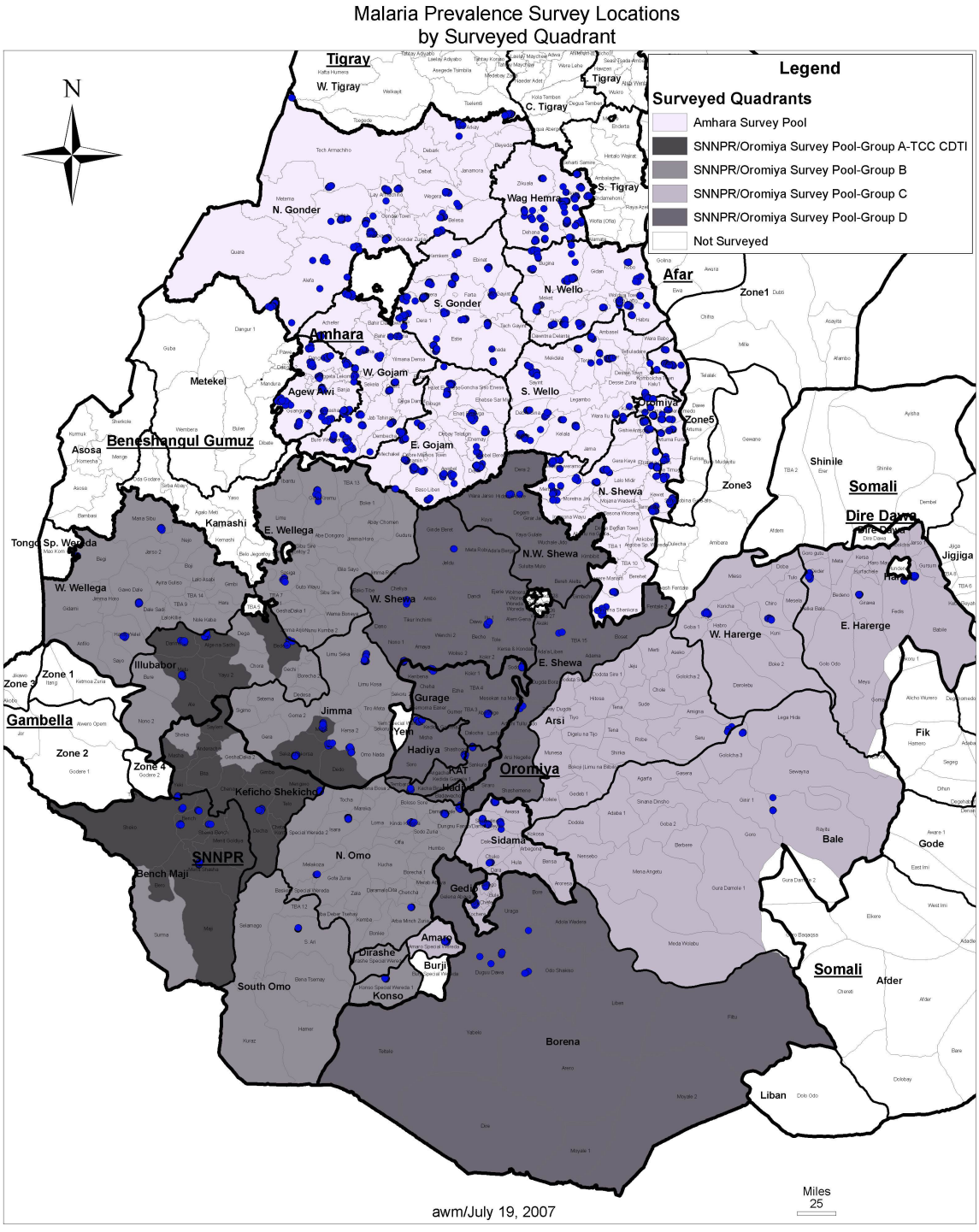
1) Assess the risk of malaria and trachoma through the collection of household level baseline data for malaria and trachoma risk indicators, including: housing construction, social-economic status, availability of latrines and water, altitude, coverage of spraying and use of nets.

2) Determine baseline coverage of LLINs, untreated mosquito nets and indoor residual spraying.

3) Estimate the prevalence of malaria in all age groups through a malaria parasite prevalence survey.

4) Determine the prevalence of trachoma in all age groups in Amhara region, including the prevalence of trichiasis and the need for surgeries.

Figure 1: Map of the surveyed households



Sample Design

The design was a population-based household cluster survey with 224 clusters of 25 households each. Zone-level estimates of indicators were obtained for Amhara region, and sub-regional estimates were obtained for Oromia and SNNPR. Even-numbered households were eligible for malaria parasite testing. All persons in selected households in Amhara were examined for trachoma signs.

Figure 1 shows the sampled areas and domains as well as the survey sites. Detailed information on sample size and selection are given in Appendix A. Briefly, a multi-stage cluster random sampling of woreda (eight per zone), malarious kebele (two per woreda) and state team (five with five houses in each) was done in Amhara. All ten Amhara zones were surveyed as separate domains, with 16 clusters in each (total 160 clusters). Bahir Dar town and two woredas with less than 10% of the population living in malarious areas were excluded.

In Oromia and SNNPR, sampling was done directly at the kebele level. Each region was divided into 4 quadrants (A,B,C,D) with quadrant A in each representing the areas given annual treatment with ivermectin for onchocericasis under the auspices of The Carter Center (community directed treatment with ivermection or CDTI) (see Fig 1). Eight malarious kebeles were selected per quadrant resulting in 16 total in the CDTI areas and 48 in non-CDTI areas. The total was thus 64 clusters, of which 32 were in each region. Five households from each of five state teams were selected to make up the cluster of 25 households. Weighting for probability of selection by households was done in the analysis. For further details, see Appendix A. Eight woredas in Oromia and four in SNNPR (including two special woredas) were excluded due to low malaria risk.

With the exception of quadrant A in each region (the CDTI woredas), the division of zones or special woredas into quadrants was done for logistical and convenience reasons including access from major towns and ease of transportation, The zones or special woredas represented in each quadrant are as shown in Table 1.

Table 1: Zones in each quadrant of the sampling frame in Oromia and SNNP regions.

Region	Location in region	Quadrant	Zone or special woreda
Oromia	West (CDTI woredas)	Oromia A	Illubabor (part), Jimma (part)
	West	Oromia B	Illubabor (part), Jimma (part), W. and E. Wellega
	East	Oromia C	Arsi, Bale, E. and W. Harage
	South and Central	Oromia D	Borena, Guji, E., N.W., W. and S.W. Shewa
SNNPR	West (CDTI woredas)	SNNPR A	Keffa, Sheka, Bench Maji
	South and Southwest	SNNPR B	Dawro, Gamo Goffa, Konso, S. Omo, Wolaita, Dereshe, Konta, Basketo
	Southeast	SNNPR C	Amaro, Gedeo, Sidama (excluded: Burji)
	Central	SNNPR D	Gurage, Hadiya, Silte, Kambata-Tambaro, Alaba (excluded: Yem).

Methods

Questionnaires

The questionnaire was developed as a modification of the Malaria Indicator Survey Household Questionnaire (WHO). It had three parts – the household interview, malaria parasite form, and trachoma form. The trachoma form was only used in Amhara region. The MIS was modified to survey each room in the house separately to ensure that all nets were seen in place, and so that we could ascertain the density of sleepers per room as well as how many sleeping rooms were in (or outside) each house. The persons sleeping under each net were listed.

The numerous people involved in the survey are listed in Appendix B. The questionnaires in English and Amharic are attached as Appendices C and D. It was also translated into Oromiffa as a reference for the survey teams to use verbally.

Field work

A 4 day training session for western Amhara survey teams was held in Bahir Dar for 4 days (Dec 7-10 2006) and that for eastern Amhara survey teams was held in Dessie (Dec 14-17, 2006). The Oromia and SNNPR survey teams were trained for 3 days at Adama (Jan 2-4, 2007). The training covered the survey objectives and sampling plan, but was mainly aimed at training in how to select woredas and kebeles, how to select state teams and households, and how to conduct the interview, take blood samples (RDT, slides) and do trachoma examinations.

In Amhara, a total of 20 survey teams collected data in the field. Each team included an interviewer, trachoma grader, laboratory technician and a driver. Ten zonal coordinators supervised the field activities. A total of 25 vehicles were assigned for field data collection and supervision activities. The survey was conducted between December 12, 2006 and January 13, 2007. The Oromia and SNNPR surveys involved a total of 10 survey teams each with a team leader/supervisor, interviewer, a laboratory technician and a driver. Fourteen vehicles were assigned to facilitate the field data collection and supervision activities. The survey was conducted from January 10 through February 2, 2007. For further details on the staffing and organization of teams, please see Appendix B.

Malaria parasite testing

Consenting residents of even-numbered households were recruited for the malaria parasite prevalence survey. Participants gave fingerprick blood samples for a rapid diagnostic test and for thick and thin blood films for microscopy. The rapid diagnostic test used was ParaScreen (Zephyr Biomedical Systems, www.tulipgroup.com) which is capable of detecting both *P. falciparum* and other *Plasmodium* species (in Ethiopia, most likely *P. vivax*). The test uses approximately 5 µl of blood and is readable after 15 minutes following the manufacturer's guidelines. Participants with positive rapid tests were immediately offered treatment according to national guidelines: CoArtem® for *P. falciparum* infection, chloroquine for other *Plasmodium* infection, and clinic-based quinine therapy for self-reported pregnant women.

Two blood slides, each composed of thick and thin films, were taken from each participant by a medical laboratory technician according to standard WHO-approved protocol. Slides were labelled and air-dried horizontally in a slide tray in the field. Thin films were fixed in methanol immediately after drying. They were stained with 3% Giemsa for 30 minutes at the nearest health facility when the team returned from the field. Usually, field teams returned to the clinic each evening but when working in inaccessible areas, which required walking up to eight hours each way, they were obliged to sleep in the field and stain the slides the following day. To ensure maximum participation, households with absentees were revisited a second time on the same day to recruit those missing at the first visit.

Blood slides were read at a reference laboratory in Addis Ababa and classified qualitatively as either negative, *P. falciparum* positive, *P.vivax* positive, or mixed infection. One hundred fields of the thick film were examined at a magnification of 1000x before identifying a slide as negative or positive. If positive, the thin film was read to determine the species. Parasite density was not quantified. To ensure accuracy, all positive slides and a random sample of 5% of the negative slides were re-examined by a separate microscopist, who was blinded to the diagnosis of the first slide-reader. The second slide from each participant was used if the first was broken or unreadable. The identity of survey participants who had positive blood slides was sent back to the field teams for follow-up and appropriate treatment, where necessary (e.g. where the rapid diagnostic test had been negative but the slide positive).

Trachoma examination

Trachoma grading was carried out by Integrated Eye Care Workers who were experienced in using the WHO simplified grading scheme [WHO 1991]. This scheme has five stages: trachomatous inflammation-follicular (TF), trachomatous inflammation-intense (TI), trachomatous scarring (TS), trachomatous trichiasis (TT) and corneal opacity (CO). Minimum accepted inter-observer agreement was set at 80% and reliability assessed in two stages. In the first stage, potential examiners identified trachoma grades using the WHO set of trachoma slides (Thylefors et al 1987). Those examiners who achieved at least 80% agreement then proceeded to the second stage of field evaluation. During field evaluation a reliability study comprising 50 persons of varying age and sex were selected by the senior examiner to represent all trachoma grades. Each potential examiner evaluated all 50 subjects independently and recorded their findings on a pre-printed form. Inter-observer agreement was then calculated for each trainee using the senior examiner's observation as the 'gold standard'. Examiners achieving at least 80% inter-observer agreement after the field evaluation were included as graders.

All persons living within each selected household who gave verbal consent were examined using a torch and a 2.5x magnifying binocular loupe. Each eye was examined first for in-turned lashes (TT), and the cornea was then inspected for corneal opacities (CO). The upper conjunctiva was subsequently everted and examined for inflammation (TF and TI) and scarring (TS). Signs had to be clearly visible in accordance with the simplified grading scheme in order to be considered present. Alcohol-soaked cotton-swabs were used to clean the examiner's fingers between examinations. Individuals with signs of active trachoma (TF and/or TI) were offered treatment with 1% tetracycline eye ointment. TT patients were referred to health centres where free eyelid surgery was available.

Data to determine whether children aged 1-9 years had a 'clean face' were collected during the eye examinations. Facing the child, the observer looked for the presence of ocular and nasal discharge, recording each separately as a dichotomous variable. Ocular discharge was defined as any material of any colour or consistency in the corner of the eyes, or matting of the eyelashes caused by such a discharge (tears, medication and make-up were excluded). Nasal discharge was defined as the presence of dry exudate of any colour below one or both nostrils.

Quality control, data entry and analysis

Forms were checked by the supervisor in the field and inconsistencies verified with the respondent. Data were double entered by different entry clerks and compared for consistency using Census and Survey Processing System (CSPro: U.S. Census Bureau Washington DC, USA).

The data entry team and three sub-teams were led by Dr. Eshetu Gurmu. A programmer designed the data entry template and the "S*kip and Range Rules"* using CSPro software. The questionnaire review and editing sub-team were responsible for reviewing of field questionnaires and checking the consistency of the responses. The data entry sub-team entered data from the reviewed questionnaire into computer using the designed template in CSPro. Double data entry and checking were done. The programmer then exported the data to SPSS.

Statistical analysis was conducted using Stata™ 9.2 (Stata Corporation, College Station, Texas, USA). Descriptive statistics were used to describe the characteristics of the sample. Sampling probabilities were calculated for woredas, kebeles and state teams. Sampling weights were then derived as the inverse of the product of sampling probabilities at the woreda, kebele and state team levels. Point estimates and confidence intervals were derived using the SURVEY (SVY) routine in Stata which allowed for adjustment for clustering in the sampling design as well as weighting for sampling probability. For further details see Appendix A.

To give greater precision in the estimates of trichiasis burden, TT prevalence was modelled for sex-specific ten-year age groups using logistic regression. Prevalence of TT was calculated for ten-year age groups for males and females separately for each zone. Ten-year age population structures by sex were obtained for each zone from the Bureau of Finance and Economic Development for Amhara region and applied to the ten-year age group TT prevalence estimates for males and females. The 95% confidence intervals of the point prevalence estimates were multiplied by the respective population structure estimates to derive the lower and upper bounds of the TT burden. All zonal estimates and corresponding upper and lower bounds were summed to derive the state-wide estimate of those requiring TT surgery.

Ethical approval

The protocol received ethical approval from the Emory University (Atlanta, USA) Institutional Review Board and the Regional Health Bureaus. Verbal informed consent to participate in interviews and trachoma screening was sought from the head of each household, each individual and the parents of children aged 10 years and younger in accordance with the tenets of the declaration of Helsinki. Signed informed consent was sought from each individual and parents of children aged 10 years and younger in accordance with the tenets of the declaration of Helsinki

for blood films. Personal identifiers were removed from the data set before analyses were undertaken.

Results

The sampling for this survey was conducted in two separate ways depending on the region. In Amhara, sampling was aimed at determining estimates by zone for trachoma, malaria and mosquito net coverage. In Oromia and SNNPR, it was designed with the future aim of comparing malaria prevalence and risk factors in two distinct groups: within and outside the Carter Center assisted onchocerciasis endemic areas (known as Community Directed Treatment with Ivermectin (CDTI) and non-CDTI areas).

In the results which follow, the two parts of the survey with different sampling schemes (Amhara and Oromia/SNNPR) are often described separately, but overall and regional estimates are also given. In some cases, results in Oromia/SNNPR are given for survey 'quadrants' (groups of districts or zones) and/or for CDTI and non-CDTI areas. The locations of these areas can be seen in the Map (Figure 1).

It should also be noted that the sample size differs for different risk factor and outcome indicators. The numbers of people evaluated for net use, trachoma and malaria prevalence were different and not completely overlapping. Malaria prevalence was only determined for people living in even-numbered houses as assigned during the sampling.

Response rates in the survey depended on the indicator being sampled. For household risk factors, net ownership and net use the participation rate was 97% in Amhara and 98% in Oromia/SNNPR. Malaria slides were available and readable for 85% (Amhara) and 82% (Oromia/SNNPR) or eligible persons. In Amhara, 88% of those eligible had a trachoma eye examination.

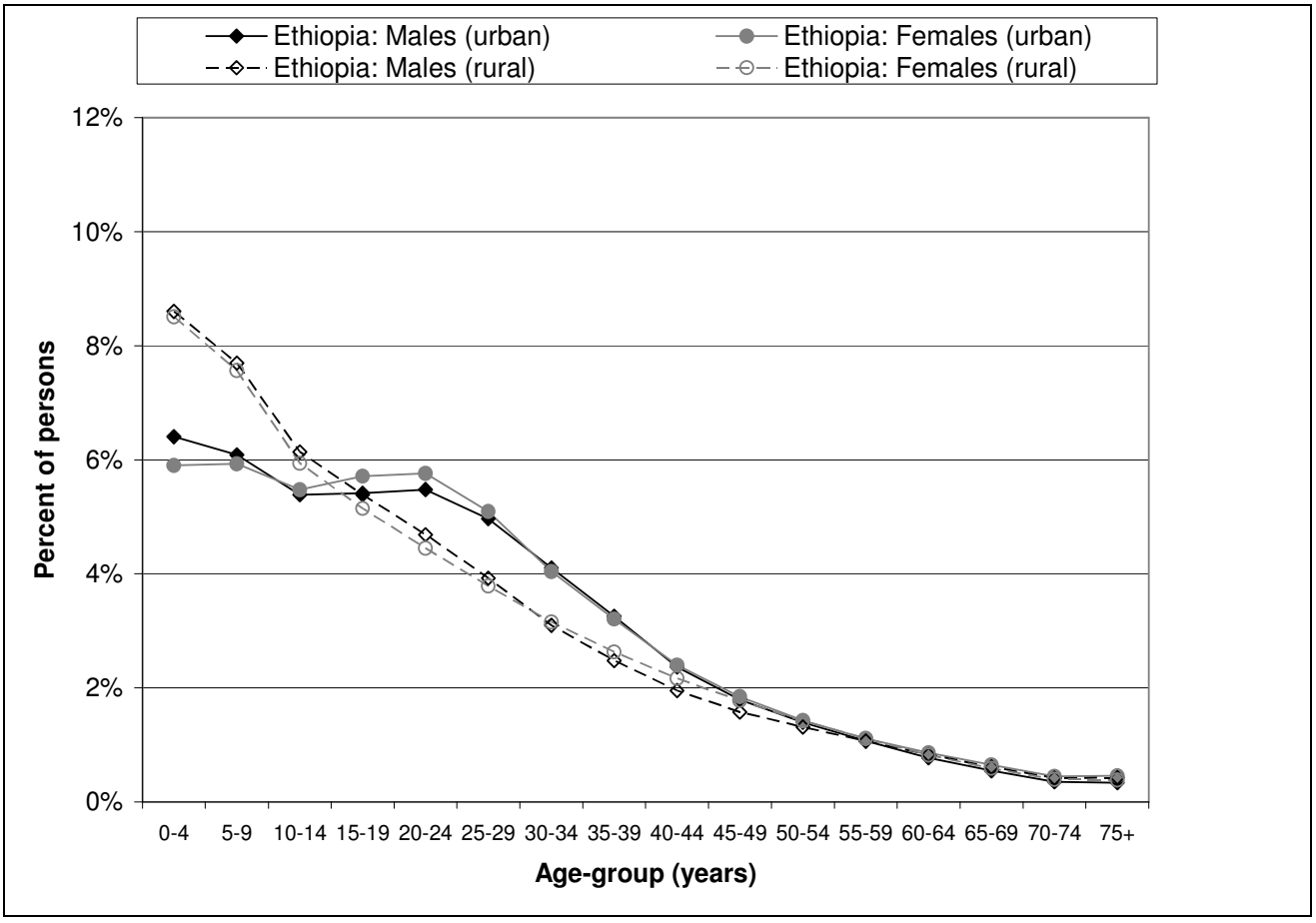
All analysis given in the results section is derived from estimates weighted for the probability of selection. In Amhara this involved weighting by probability of selection by woreda, kebele and state team. In Oromia/SNNPR, weighting was by quadrant and kebele. It was not possible to weight here by probability of state team selection as we lacked information on the total number of state teams in the selected kebeles.

1. Population and sample characteristics

An important task is to determine whether our sampled population was representative of the overall population. Therefore we first examine the typical distribution of age-groups in Ethiopia, and then plot the age-distribution in our sampled population.

The distribution of age groups for Ethiopia differs by whether the population is urban or rural (Fig 1.1). Fewer children and more young adults are found in urban than rural areas. This is true for both males and females.

Figure 1.1: Percent distribution of the population by five-year age groups, according to urban/rural residence, Ethiopia EC 1998-1999 (GC 2006) (from projected census data).



Source: www.csa.gov.et

Next we turn to the distribution of people in the sampled population. In Figures 1.2 and 1.3, the terms "Household sample" refers to those people who were evaluated for net use during the household portion of the questionnaire. The terms "Malaria sample" and "Trachoma sample" refer to the people who were evaluated for these two diseases respectively (with trachoma being assessed only in Amhara). These three samples had very similar age distributions.

It can be seen in Figs 1.2 and 1.3 that our sampled populations represented more closely the rural rather than the urban distribution shown in Fig 1.1. This is not surprising since the major towns were excluded from the sampling frame. However, there are some notable differences from the rural population distribution. In both survey groups, there appeared to be a deficiency of children under five (or excess of children 5 to 9 years) of both sexes. In addition, there were fewer males than females in the age range of 20 to 45 years (Amhara, Fig 1.2) or 20 to 30 years (Oromia/SNNPR, Fig 1.3).

Figure 1.2: Percent distribution of the sampled population by five-year age group, Amhara

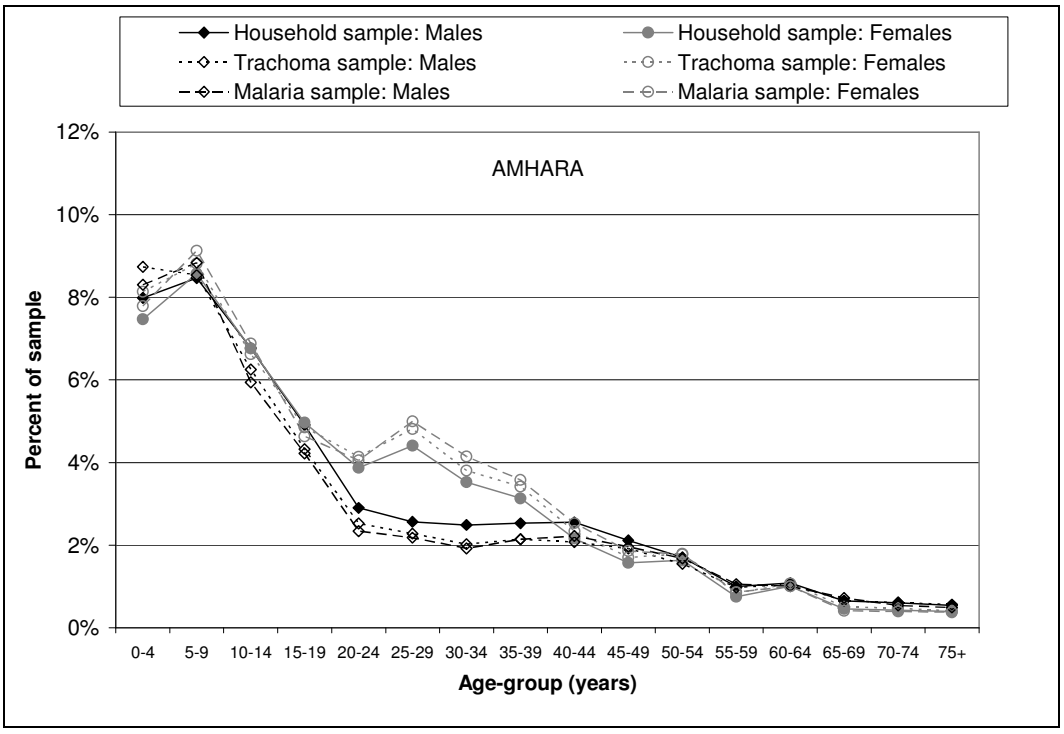
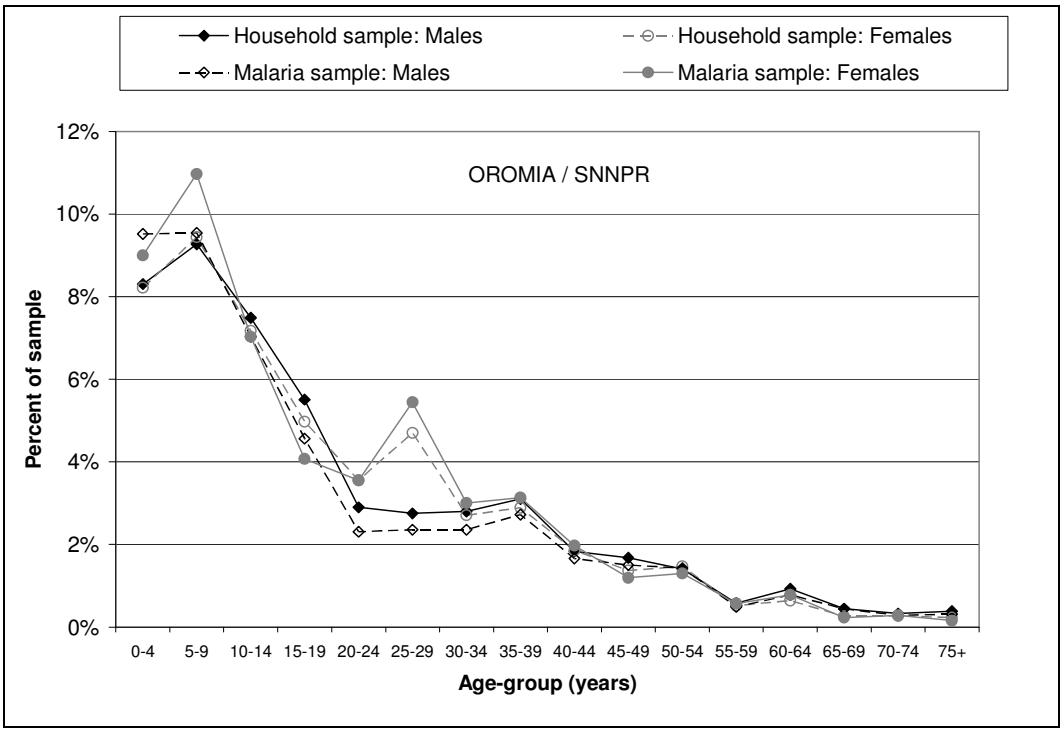


Figure 1.3: Percent distribution of the sampled population by five year age group, Oromia and SNNPR.



2. Household characteristics

Table 2.1 shows descriptive characteristics for the 5,708 households that were included in the sample. Most houses (85.4%) had only one sleeping room. A very small proportion of people (<1%) reported sleeping outside. Despite the sampling discrepancy between males and females in certain age groups noted above, the survey overall had only a slight deficiency of males who represented 48.8% of all participants.

Table 2.1: Household composition

Characteristic	Region			Total
	Amhara	Oromia	SNNPR	
Number of Households	4,101	809	798	5,708
Number of sleeping rooms/HH				
1	3,701	576	595	4,872
2	362	183	175	720
3	35	38	24	97
4	2	8	2	12
5+	1	4	2	7
Mean rooms/HH	1.1	1.3	1.3	1.1
Median	1	1	1	1
HH with people sleeping outside				
	9	17	0	26
%	0.04%	0.31%	0%	0.07%
Number of participants	19,669	4,428	4,397	28,494
Percent male	48.7%	49.8%	50.1%	48.9%
No persons/HH				
1	96	11	6	113
2	434	54	32	520
3	693	106	103	902
4	710	117	127	954
5	733	135	160	1028
6	624	165	161	950
7	407	87	89	583
8	216	54	45	315
9+	187	80	75	342
Mean persons per HH	4.7	5.4	5.6	4.9
(95% CI)	(4.6-4.9)	(5.1-5.7)	(5.3-5.9)	(4.8-5.0)

HH: household

There were 28,994 people participating in the survey. The average number of persons per household ranged from 4.7 to 5.6 by region and was 4.9 overall (95% confidence interval 4.8 to 5.0) (Table 2.1). In Amhara the median household size was 5 whereas in both Oromia and SNNPR it was 6 persons.

Table 2.2: Household characteristics, by region

Characteristic	Region			
	Amhara	Oromia	SNNPR	Total
Number of households (N)	4,101	809	798	5,708
Main source of drinking water:				
Improved water source *	34.4%	22.0%	50.8%	33.9%
Unsafe water source **	65.7%	78.0%	49.3%	66.1%
Time to collect water:				
<30 minutes	74.1%	63.9%	49.6%	71.3%
>=30 minutes	25.9%	36.1%	50.4%	28.7%
Sanitation facilities:				
Bush / open field	75.7%	77.1%	40.5%	73.6%
Pit latrine	24.3%	22.8%	59.5%	26.4%
Flush toilet	0.0%	0.1%***	0.0%	<0.1%
Main material of walls:				
Sticks	90.5%	94.0%	98.0%	91.4%
Mud block	5.7%	2.7%	1.9%	5.1%
Other	3.8%	3.3%	0.1%	3.5%
Main material of roof:				
Thatch	57.1%	6.8%	0.8%	47.5%
Corrugated iron	41.2%	67.0%	75.1%	46.4%
Other	1.7%	26.3%	24.1%	6.1%
Main material of floor:				
Earth	73.3%	94.4%	77.7%	76.1%
Dung plaster	25.4%	4.7%	20.8%	22.7%
Other	1.3%	0.9%	1.5%	1.3%
Services and durable goods:				
No electricity	94.3%	97.9%	94.1%	94.7%
No radio	75.2%	62.9%	58.7%	72.7%
No TV	98.8%	98.8%	98.8%	98.8%

*capped spring, protected dug well, tube well/borehole, cart with small tank, public tap/standpipe, piped water
**unprotected spring, unprotected dug well, surface water
*** 1 flush toilet in Oromia

Household characteristics evaluated include the usual source of drinking water, the time to collect water, the availability of latrines, household construction materials and possession of electricity, TV and/or radio. We defined the usual source of drinking water as being 'safe' if it was a capped spring, protected hand-dug well, tube well, borehole, cart with small tank, or piped water. Other water sources were described as 'unsafe' and were unprotected springs, unprotected hand-dug wells, and surface water.

Table 2.2 shows that in Amhara and Oromia, the majority of people most frequently used 'unsafe' water supplies, whereas in SNNPR it was about even between 'unsafe' and 'improved' water supplies. More households in SNNPR (50.4%) than in the other two regions (25.9 – 36.1%) had to travel >30 minutes on average to get their water. Overall the proportion of households with 'safe' water supply was 33.9%, and 28.7% of households had to travel more than 30 minutes to their usual source.

The great majority of households (73.6%) had no access to latrines of any kind (Table 2.2). Again, Amhara and Oromia lagged behind SNNPR in this regard, with more than half of houses in SNNPR having a latrine. Only one flush toilet was encountered in the survey.

More than 90% of households in all regions were made of wood, and more than 70% had earth floors. However the roof material varied, with the majority of houses in SNNPR and Oromia having corrugated iron roofs compared to Amhara, where 57.1% had thatch roofs.

Electricity and televisions were very rare in the surveyed households. Radios were more common, but only 27.3% of houses had a functioning radio.

3. Malaria prevalence

In this report we give the blood slide prevalence results. The rapid diagnostic tests were included for immediate treatment purposes and will be reported at a later date.

The overall prevalence of a positive blood slide (any species) was 4.1% (95% CI 3.4-4.9). This varied greatly by region, being 4.6% (95% CI 3.8-5.6) in Amhara, 0.9% (95% CI 0.5-1.6) in Oromia and 5.4% (95% CI 3.4-8.5) in SNNPR. The prevalence of each species by region is shown in Fig 3.1, and more detailed breakdowns by zone, quadrant or CDTI area are given in Table 3.1 (Amhara) and Table 3.2 (Oromia and SNNPR).

The vertical bars in Fig 3.1 represent 95% confidence intervals around the estimates. It is clear that Oromia had a significantly lower prevalence than the other two regions, which are not significantly different from each other. *Plasmodium falciparum* prevalence was higher than *P.vivax* in all regions.

Figure 3.1: Prevalence of malaria (by slide), by malaria species, region and overall

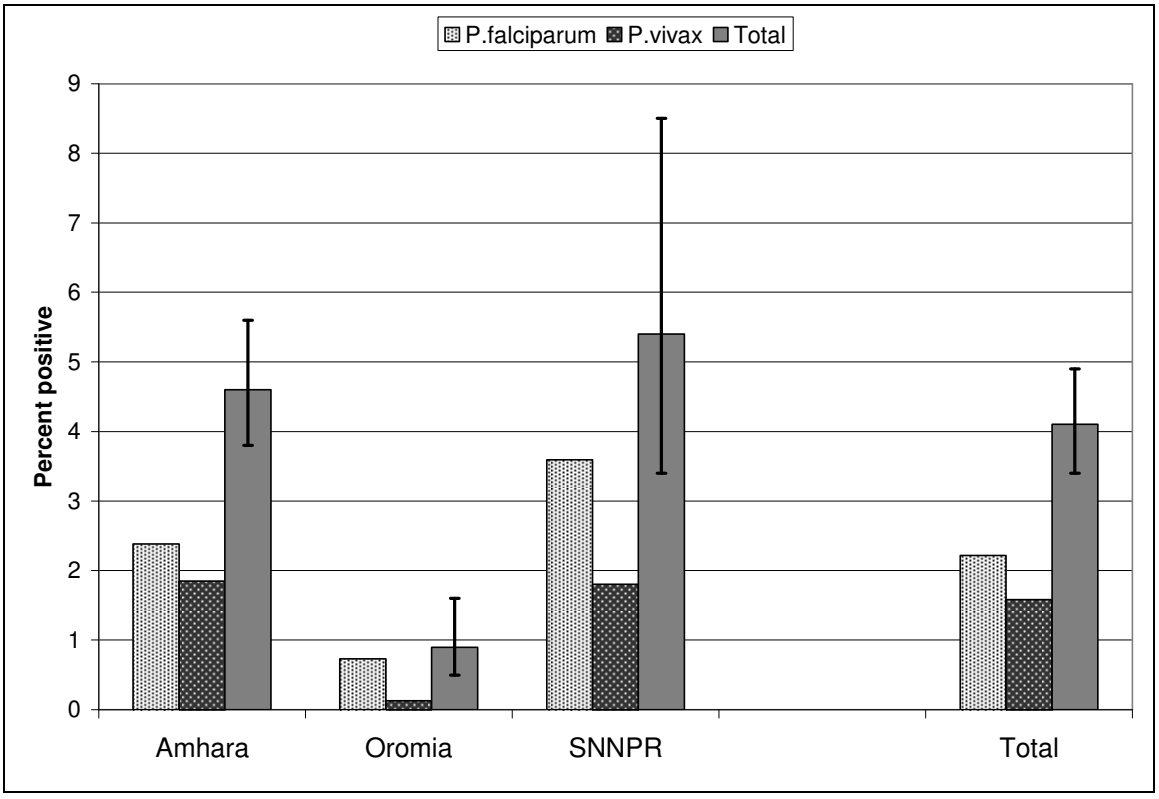


Table 3.1: Prevalence of malaria (by slide): Amhara region and by zone.

Domain	Number examined	Malaria parasite prevalence (%)				Pf:Pv ratio
		P.falciparum only	*P.vivax* only	Mixed Pf and Pv	Total* % (95% CI)	
Amhara	7,745	2.4	1.9	0.4	4.6 (3.8-5.6)	1.2
Zones						
North Gondar	703	3.1	2.8	0.0	5.9 (4.2-8.2)	1.1
Waghemira	809	2.0	1.0	0.2	3.1 (1.5-6.4)	1.9
South Gondar	744	2.7	2.5	0.8	6.1 (4.3-8.5)	1.1
North Wollo	835	1.3	1.5	0.4	3.1 (1.5-6.2)	0.9
West Gojjam	713	1.5	1.7	0.3	3.4 (1.7-6.7)	0.9
Awi	799	2.4	2.8	0.4	5.6 (2.4-12.3)	0.9
East Gojjam	699	2.9	1.6	0.4	4.9 (2.4-9.6)	1.7
South Wollo	758	3.6	1.5	0.5	5.6 (3.2-9.4)	2.1
Oromia	825	1.0	1.1	0.3	2.4 (1.5-4.0)	0.9
North Shewa	860	2.6	2.0	0.2	4.8 (2.7-8.4)	1.3

Pf: *Plasmodium falciparum;* Pv: *Plasmodium vivax*

In Amhara (Table 3.1), a total of 7,745 blood slides were examined with good concordance between first and second reading. Positive slides were found in all zones. The overall malaria parasite prevalence in Amhara was 4.6% (95% CI 3.8–5.6) with prevalence by zone ranging from 2.4% (95% CI 1.5-4.0) in Oromia zone to 6.1% (95% CI 4.5-8.5) in South Gondar. The malaria species seen most frequently was *P. falciparum*: 52.2% of positive slides had *P. falciparum* only and 8.7% were mixed *P. falciparum and P. vivax*. *Plasmodium vivax* only was seen on 41.3% of the positive slides. The overall ratio of *P. falciparum* to *P. vivax* was 1.2 with zonal estimates ranging from 0.9 to 2.1.

Table 3.2: Prevalence of malaria (blood slide microscopy): Oromia and SNNP regions and by quadrant and CDTI area.

Domain		Number examined	Malaria species (%)				Pf:Pv ratio
			P.falciparum only	*P.vivax* only	Mixed Pf and Pv	Total* % (95% CI)	
Oromia Region		1996	0.7	0.1		0.9 (0.5-1.6)	5.6
Quadrant							
	A	522	0.2	1.0		1.2 (0.7-1.9)	0.2
	B	487	0.7	0.0		0.7 (0.1-4.0)	
	C	496	1.9	0.0		1.9 (0.9-3.7)	
	D	491	0.0	0.0		0	
SNNP Region		1860	3.6	1.8		5.4 (3.4-8.5)	2.0
Quadrant							
	A	467	1.6	0.6		2.2 (0.3-15.0)	2.9
	B	386	0.6	0.4		1.1 (0.3-3.0)	1.6
	C	485	3.9	3.3		7.2 (3.8-13.2)	1.2
	D	522	6.9	3.0		9.9 (6.1-15.8)	2.3
Oromia and SNNPR		3856	1.7	0.69		2.4 (1.6-3.5)	2.4
CDTI area		989	0.72	0.83		1.6 (0.6-4.3)	0.9
Non-CDTI area		2867	1.84	0.67		2.5 (1.6-3.8)	2.7

Pf: *Plasmodium falciparum*; Pv: *Plasmodium vivax*

In Oromia and SNNPR combined (Table 3.2), 3,856 slides were examined of which 2.4% (95% CI 1.6-3.5) were positive. No mixed infections were detected in these regions. *Plasmodium falciparum* was found in 1.7% of slides and *P.vivax* in 0.69%, giving a Pf:Pv ratio of 2.4. Positive cases were found in all sampled quadrants except D in Oromia region, which covers Borena, Guji and E, NW, SW and W Shewa zones (refer to Map Fig 1).

The prevalence by sampled area (zone or quadrant) in all three regions is shown graphically with 95% confidence intervals in Fig 3.2.

Figure 3.2: Malaria prevalence (by slide), any species, by zone, quadrant or CDTI area.

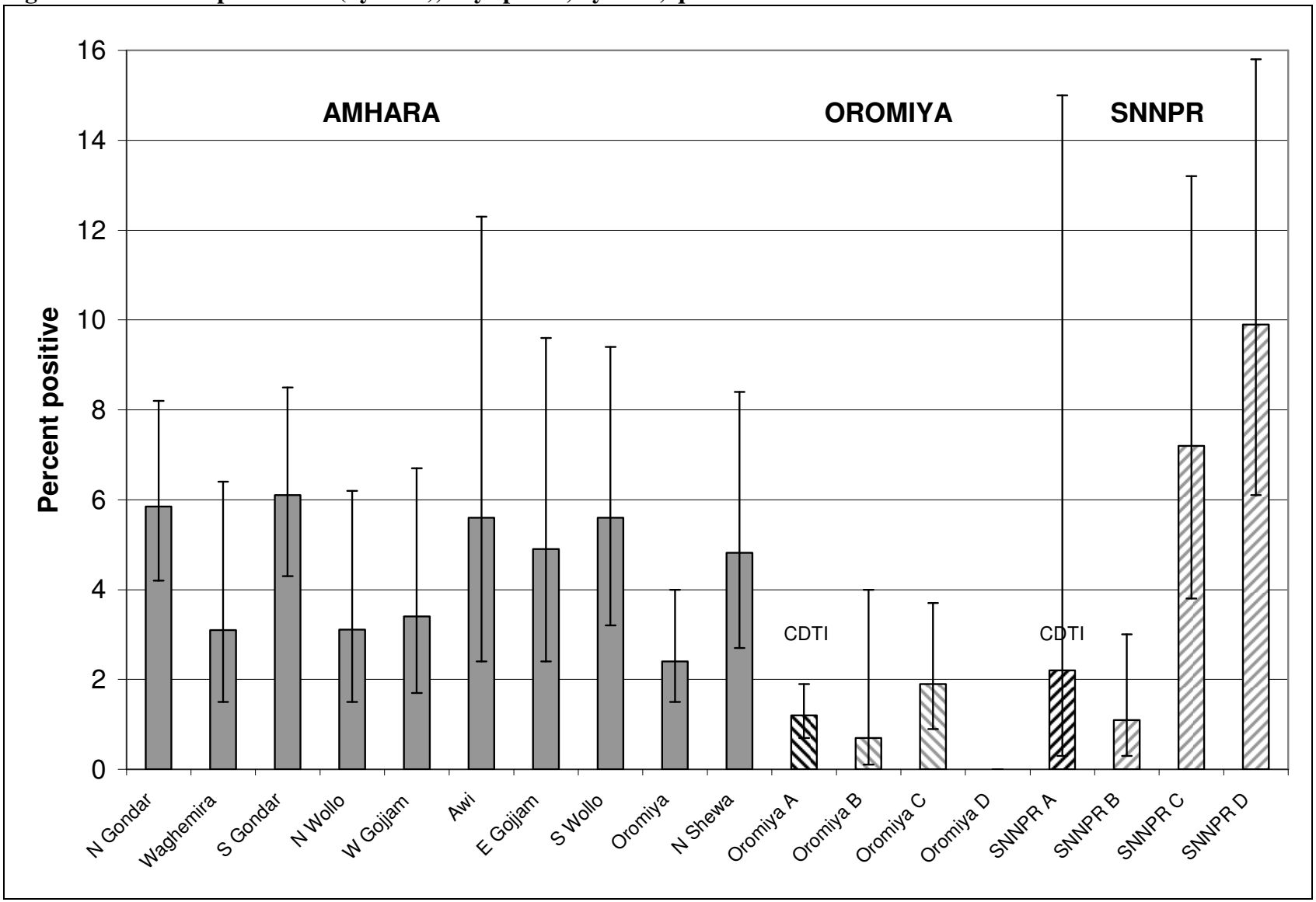


Table 3.3 Malaria prevalence (by slide), by region, age group, gender and species

		Male				Female				Total				Species (%)			Pf:Pv ratio
Domain	Age group	N	n	%	95% CI	N	n	%	95% CI	N	n	%	95% CI	*P. falciparum* only	*P.vivax* only	Mixed Pf and Pv	
Amhara	<5 yrs	643	28	5.4	(3.5-8.4)	603	31	5.7	(3.7-8.6)	1,246	59	5.5	(4.0-7.6)	3.2	2.1	0.3	1.5
	5-14 yrs	1,144	43	5.1	(3.4-7.4)	1,240	49	4.3	(2.9-6.3)	2,384	92	4.6	(3.4-6.2)	2.6	1.6	0.4	1.5
	15-49 yrs	1,316	55	4.3	(3.1-5.8)	1,998	94	4.2	(3.1-5.8)	3,314	149	4.3	(3.4-5.4)	2.0	1.8	0.4	1.1
	>=50 yrs	426	17	4.6	(2.4-8.9)	375	18	4.5	(2.7-7.5)	801	35	4.6	(2.9-7.2)	1.8	2.4	0.4	0.8
	Total	3529	143	4.8	(3.7-6.1)	4216	192	4.5	(3.5-5.6)	7745	335	4.6	(3.8-5.6)	2.4	1.9	0.4	1.2
Oromia	<5 yrs	225	1	0.5	(0.1-3.9)	213	2	1.2	(0.2-6.7)	438	3	0.9	(0.2-3.1)	0.9	0		
	5-14 yrs	293	1	0.5	(0.1-3.8)	368	4	0.9	(0.2-3.5)	661	5	0.7	(0.3-2.0)	0.5	0.2		2.7
	15-49 yrs	342	2	0.7	(0.1-4.9)	420	4	0.8	(0.2-3.2)	762	6	0.7	(0.3-2.1)	0.7	0		
	>=50 yrs	66	2	4.5	(1.1-16.6)	69	0	0.0		135	2	2.3	(0.6-8.)	1.2	1.0		1.2
	Total	926	6	0.9	(0.4-1.8)	1,070	10	0.9	(0.3-2.3)	1,996	16	0.9	(0.5-1.6)	0.7	0.1		5.6
SNNPR	<5 yrs	142	11	8.2	(3.8-16.7)	134	6	4.0	(1.5-10.3)	276	17	6.1	(3.1-11.8)	4.5	1.6		2.8
	5-14 yrs	346	23	6.2	(3.7-10.4)	326	20	7.1	(2.8-17.0)	672	43	6.7	(3.4-12.5)	3.8	2.9		1.3
	15-49 yrs	332	16	4.9	(2.3-9.8)	443	20	3.5	(2.0-6.2)	775	36	4.1	(2.3-7.2)	2.8	1.2		2.3
	>=50 yrs	78	5	5.3	(1.6-16.0)	59	4	5.2	(1.6-15.8)	137	9	5.3	(2.5-10.8)	4.9	0.4		14.1
	Total	898	55	6.0	(3.9-9.0)	962	50	4.9	(2.7-8.7)	1,860	105	5.4	(3.4-8.5)	3.6	1.8		2.0
All regions	<5 yrs	1,010	40	4.6	(3.1-6.8)	950	39	4.6	(3.1-6.7)	1,960	79	4.6	(3.4-6.1)	2.8	1.6	0.2	1.7
	5-14 yrs	1,783	67	4.5	(3.2-6.2)	1,934	73	4.0	(2.8-5.6)	3,717	140	4.2	(3.2-5.5)	2.4	1.5	0.3	1.5
	15-49 yrs	1,990	73	3.8	(2.8-5.1)	2,861	118	3.7	(2.8-5.0)	4,851	191	3.8	(3.0-4.7)	1.9	1.5	0.3	1.2
	>=50 yrs	570	24	4.7	(2.6-8.2)	503	22	4.1	(2.5-6.6)	1,073	46	4.4	(2.9-6.6)	2.0	2.1	0.4	0.9
	Total	5353	204	4.3	(3.4-5.3)	6,248	252	4.0	(3.2-4.9)	11,601	456	4.1	(3.4-4.9)	2.2	1.6	0.3	1.3

Pf: *Plasmodium falciparum*; Pv: *Plasmodium vivax*

The age and gender-specific prevalence, by region and species, are shown in Table 3.3. This table and Fig 3.3 demonstrate that there is no significant difference in prevalence by age group, by region or overall. Neither is there a consistent pattern of age-specific prevalence by malaria species (Fig 3.3).

Table 3.3 and Fig 3.4 show that there is no difference in prevalence between males [4.3% (95% CI 3.4 – 5.3)] and females [4.1% (95% CI 3.4 – 4.9)].

Figure 3.3: Malaria prevalence (by slide), by species and age group.

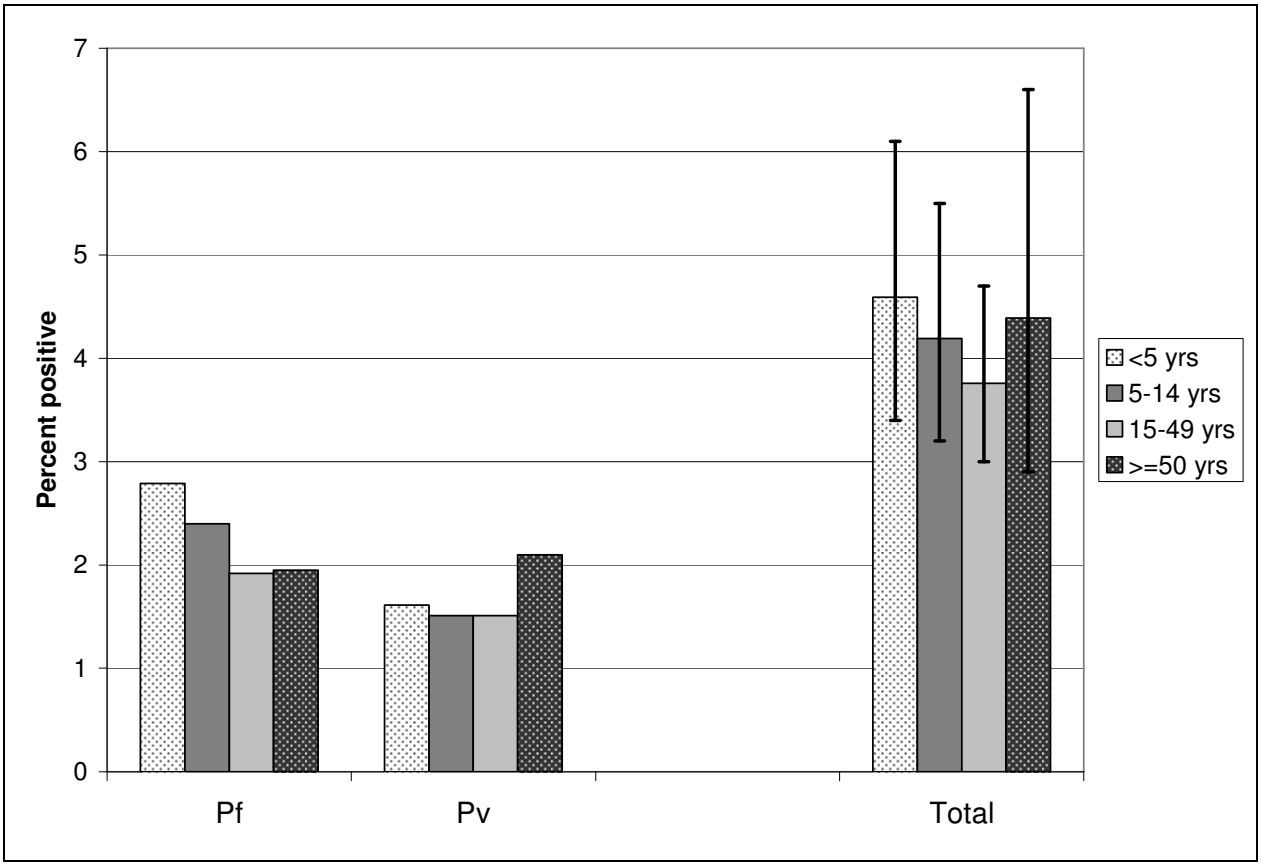
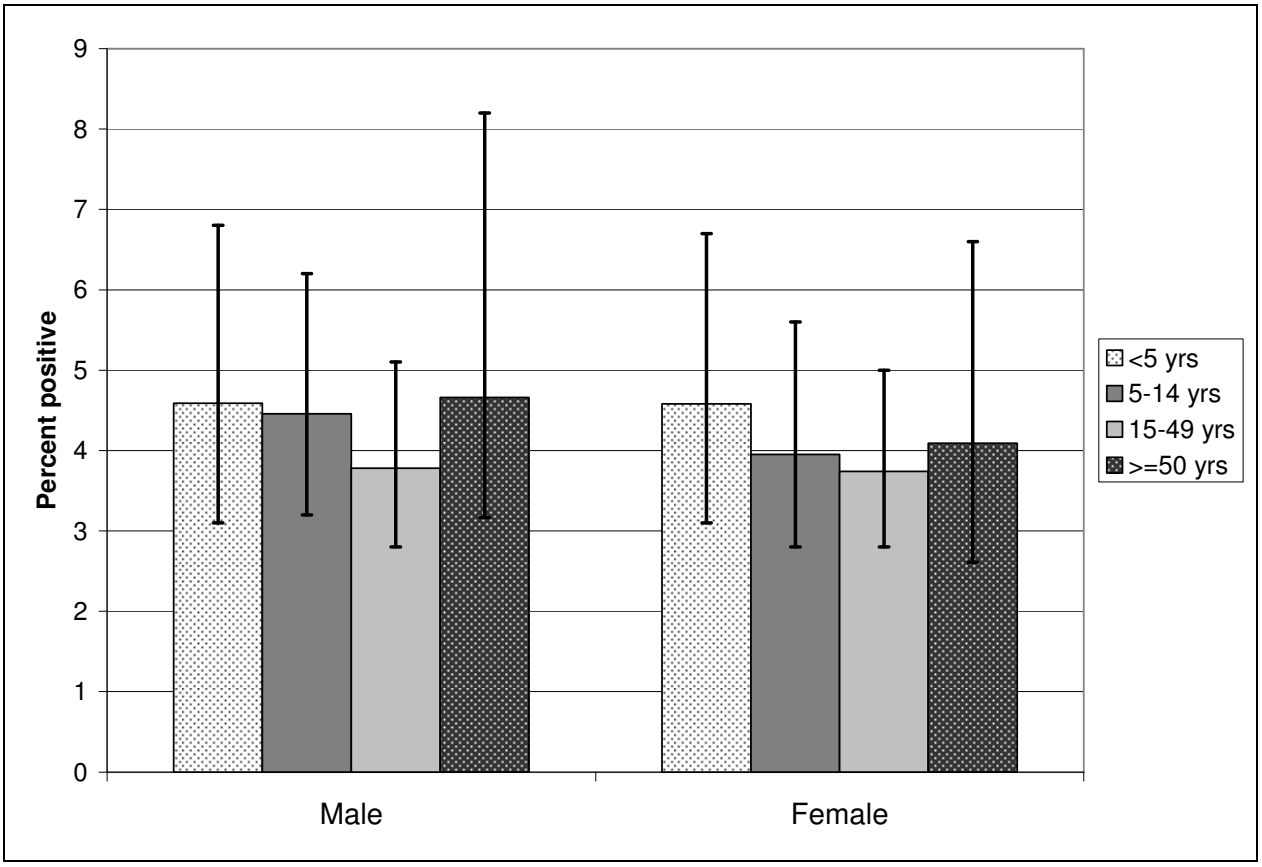


Figure 3.4: Prevalence of malaria (by slide), by gender and age group



Next we turn to prevalence by altitude (Tables 3.4 and 3.5). The altitude of each surveyed household was determined at the time of the survey. Amhara had the greatest range of altitudes in the households sampled; in Oromia and SNNPR there were no households below 1000 m or above 2500 m. The majority of households (93.4%) were at altitudes of 1000 to 2500m. Surprisingly, there were a significant number of malaria cases detected at altitudes over 2000m and even above 2500m.

In Amhara, there was an expected decline in prevalence by altitude class, up to 3000m (Table 3.4). However, the prevalence above 2500m was still 3.2% (18 out of 543 persons tested). In the 103 persons tested who lived above 3000m, there were 7 positive cases (7.8% prevalence), but 6 of these (all *P.falciparum*) were in one household. The other case was *P.vivax* in a different household although it was in the same cluster.

In Oromia, no positive were detected above 2000m (Table 3.4), but in SNNPR there was a high prevalence of 9.8% in the 182 people tested who lived at 2000-2500m. These 18 positive people were distributed between 9 households in 2 different clusters.

Table 3.4: Malaria prevalence (by slide), by region and altitude

	Amhara			Oromia			SNNPR		
	Number examined	Malaria prevalence		Number examined	Malaria prevalence		Number examined	Malaria prevalence	
Altitude class		%	95% CI		%	95% CI		%	95% CI
<=1000m	125	7.3	(1.9-23.9)	0			0		
>1000-1500m	859	6.1	(3.8-9.7)	343	2.4	(1.3-4.6)	327	3.2	(0.4-20.8)
>1500-2000m	2973	5.0	(3.8-6.6)	1316	0.7	(0.3-1.5)	1351	5.1	(2.8-9.1)
>2000-2500m	3142	4.1	(2.8-5.9)	337	0		182	9.8	(4.2-21.1)
>2500-3000m	543	3.2	(2.0-5.1)	0			0		
>3000m	103	7.3	(1.4-30.2)	0			0		

Table 3.5: Malaria prevalence (by slide), by altitude

		Any positive slide			Pf		Pv		Pf+Pv		Pf:Pv
Altitude class	N	n	%	95%CI	n	%	n	%	N	%	ratio
<=1000m	125	11	7.3%	(1.9-23.8)	5	4.1%	4	2.2%	2	1.1%	1.6
>1000-1500m	1,529	67	4.7%	(3.1-7.2)	42	2.7%	17	1.5%	8	0.6%	1.6
>1500-2000m	5,640	232	4.2%	(3.3-5.4)	122	2.4%	102	1.7%	8	0.2%	1.4
>2000-2500m	3,661	121	3.8%	(2.6-5.4)	67	2.0%	48	1.5%	6	0.3%	1.2
>2500-3000m	543	18	3.2%	(2.0-5.1)	7	1.0%	8	1.6%	3	0.6%	0.7
>3000m*	103	7	7.3%	(1.4-30.1)	6	6.3%	1	1.1%	0	0.0%	6.0
Total	11,601	456	4.1%	(3.4-4.9)	249	2.2%	180	1.6%	27	0.3%	1.3

Pf: P.falciparum; Pv: P.vivax

* Malaria cases clustered in one family

Overall there was a declining trend in malaria prevalence from 7.3% at <1000m to 3.2% (N=543 households) at 2500-3000m (Table 3.5). However the wide confidence intervals around all the estimates by region (Table 3.4) and overall (Table 3.5) mean that no significant relationship difference by altitude class can be detected.

An altitude of 2500m (sometimes 2000m) is often described as the limit of transmission in Ethiopia. Even though some of the cases we found above this altitude may have resulted from local epidemics or from movement of people from lower altitudes, it would be dangerous to exclude these areas from control efforts and surveillance.

4. Coverage of malaria interventions

Malaria interventions were assessed in two ways in this study: at the household level and at the individual level. For the household as a whole, we asked about household possession of mosquito nets by type (untreated, ITN or LLIN), and (for ITN) date net last treated. We also asked about coverage and timing of indoor residual spraying (insecticide not specified), and how much of the wall area was covered by spraying.

At the individual level, rooms in which people slept were numbered and each net was sighted by sleeping room in the house (or outside). We enquired about who slept in each net the previous night, with age and sex information on individuals as well as self-reported pregnancy for women aged 15 to 49. It was also determined in which room each person without a net slept.

We found poor recollection of local net impregnation and its timing, with a large amount of missing data, and therefore decided to report results for nets by two categories: "any net" and LLIN. The LLIN were usually easy to identify and had been recently distributed. We report proportion of houses that owned at least one net and at least one LLIN, as well as the mean number of each type owned per household, bearing in mind that the target is to provide a mean of two LLIN per house in malarious areas.

Results on whether people slept under a net, and which type, the previous night are presented separately for all individuals, for children under five, and for pregnant women.

4.1 Household net coverage

Overall 37.0% (95% CI 31.1-43.3) of households possessed at least one net; the maximum number of nets owned was 5 and the median was 0. Only 19.6% (95% CI 15.5-24.5) owned at least one LLIN. The mean number of nets of any type was 0.6 (95% CI 0.5-0.7) per house and of LLIN 0.3 (95% CI 0.2-0.4) per house.

Net ownership varied by region and within region. In Amhara, 34.7% and 16.6% of households owned at least one net and one LLIN respectively, but this varied by zone from 5.6% and 0% in East Gojjam to 99.9% and 53.6% in Oromia zone of Amhara (Table 4.1.1). The mean numbers of nets and LLIN per house in Amhara were 0.5 and 0.3 respectively.

There was less striking variation by quadrant in Oromia and SNNP regions (Table 4.1.2). In Oromia, 45.4% owned a net of any type and 32.5% owned at least one LLIN, while the ownership was higher in SNNPR where the equivalent estimates were 51.2% and 40.1%. The range by quadrant was 25.2% to 63.9% for any net and 10.6% to 59.5% for LLIN. The mean numbers of nets and LLIN per house were 0.7 and 0.5 in both regions.

Net ownership (both any net or LLIN) and mean numbers per house seemed lower in CDTI than non CDTI areas (Table 4.1.3), but the differences were not statistically significant.

Table 4.1.1: Household net coverage by zone, Amhara

Characteristic		North Gondar	Wag-himra	South Gondar	North Wollo	West Gojjam	Awi	East Gojjam	South Wollo	Oromia	North Shewa	Total
Number of Households		392	410	415	404	400	395	459	403	400	423	4,101
Households with >= 1 net	%	50.5	52.8	55.6	47.2	33.8	21.3	5.6	6.1	99.9	19.2	34.7
	95% CI	30.2-70.7	30.0-74.6	31.7-77.1	26.9-66.5	16.1-57.7	8.6-44.0	1.4-19.7	1.4-23.5	99.1-100	7.2-42.4	28.3-41.6
Mean number of nets per household	%	0.7	0.8	0.7	0.7	0.5	0.3	0.1	0.1	2.3	0.3	0.5
	95% CI	0.4-1.1	0.4-1.2	0.4-1.0	0.3-1.0	0.2-0.9	0.0-0.5	0.0-0.1	0.0-0.2	2.1-2.4	0.0-0.6	0.4-0.6
Households with >= 1 LLIN	%	33.4	52.0	4.1	30.1	13.7	9.4	0.0	4.0	53.6	11.2	16.1
	95% CI	19.0-51.7	29.2-73.9	1.3-12.3	14.1-53.1	4.2-.36.7	2.8-27.2		0.9-16.0	34.6-71.7	2.8-36.1	12.1-21.2
Mean number of LLINs per household	%	0.5	0.8	0.1	0.4	0.2	0.1	0.0	0.0	1.2	0.2	0.3
	95% CI	0.2-0.8	0.4-1.2	0.0-0.1	0.1-0.7	0.0-0.4	0.0-0.3		0.0-0.1	0.7-1.6	0.1-0.4	0.2-0.3

Table 4.1.2: Household net coverage by quadrant and region, Oromia and SNNPR

Characteristic		Oromia Region					SNNP Region					Grand Total
		A (CDTI)	B	C	D	Total	A (CDTI)	B	C	D	Total	
Number of households		200	201	208	200	809	200	199	199	200	798	1607
Households with >= 1 net	%	42.3	63.9	37.3	43.8	45.4	25.2	62.3	49.8	49.6	51.2	47.5
	95% CI	9.6-83.3	30.0-88.0	11.8-72.6	14.2-78.6	27.1-65.1	7.0-60.0	25.6-88.8	19.4-80.3	23.8-75.6	32.7-69.3	33.5-61.9
Mean number of nets per household	%	0.7	0.9	0.6	0.7	0.7	0.3	0.9	0.7	0.7	0.7	0.7
	95% CI	0.0-1.4	0.5-1.4	0.0-1.2	0.1-1.3	0.4-1.0	0.0-0.6	0.4-1.5	0.2-1.2	0.2-1.2	0.4-1.0	0.5-0.9
Households with >= 1 LLIN	%	40.9	35.0	14.6	43.8	32.5	10.6	59.5	33.4	31.8	40.1	35.1
	95% CI	9.7-81.7	10.5-71.1	2.7-49.9	14.2-78.6	17.4-52.3	1.5-48.4	25.2-86.5	11.3-66.4	10.9-64.0	23.8-58.9	23.1-49.4
Mean number of LLINs per household	%	0.6	0.5	0.2	0.7	0.5	0.1	0.9	0.5	0.5	0.6	0.5
	95% CI	0.0-1.3	0.0-1.0	0.0-0.4	0.1-1.3	0.2-0.7	0.0-0.3	0.3-1.4	0.0-0.9	0.0-1.1	0.3-0.9	0.3-0.7

Table 4.1.3: Household net coverage by Community-Directed Treatment with Ivermectin (CDTI) and non-CDTI areas in Oromia and SNNPR.

Characteristic		CDTI areas	non-CDTI areas	Grand Total
Number of households		400	1207	1607
Households with >= 1 net	%	35.5	49.2	47.5
	95% CI	11.8-69.3	33.7-64.9	33.5-61.9
Mean number of nets per household	%	0.5	0.7	0.7
	95% CI	0.0-1.0	0.5-1.0	0.5-0.9
Households with >= 1 LLIN	%	28.9	36.1	35.1
	95% CI	8.2-65.0	23.0-51.6	23.1-49.4
Mean number of LLINs per household	%	0.4	0.5	0.5
	95% CI	0.0-0.9	0.3-0.7	0.3-0.7

The frequency distribution of numbers of nets and LLIN by household is shown by region in Figure 4.1.1. The maximum number of both nets and LLIN observed per house was 5 and the median was zero in all regions.

Figures 4.1.2 and 4.1.3 summarize graphically the proportions of households possessing at least one net or one LLIN, by region and overall, with 95% confidence intervals. Amhara had significantly lower coverage with LLIN than SNNPR, with Oromia intermediate between the two (Fig 4.1.2). Mean numbers of nets per house were not significantly different by region (Fig 4.1.3).

Fig 4.1.4 gives the mean number of LLIN per house by zone or quadrant, showing the wide variation present at the time of the survey. It also shows the wide gap in most areas between the current coverage and the need to be met by distribution in 2007 to reach the goal of mean 2 LLIN per house.

Figure 4.1.1: Distribution of numbers of nets and LLIN per household, by region.

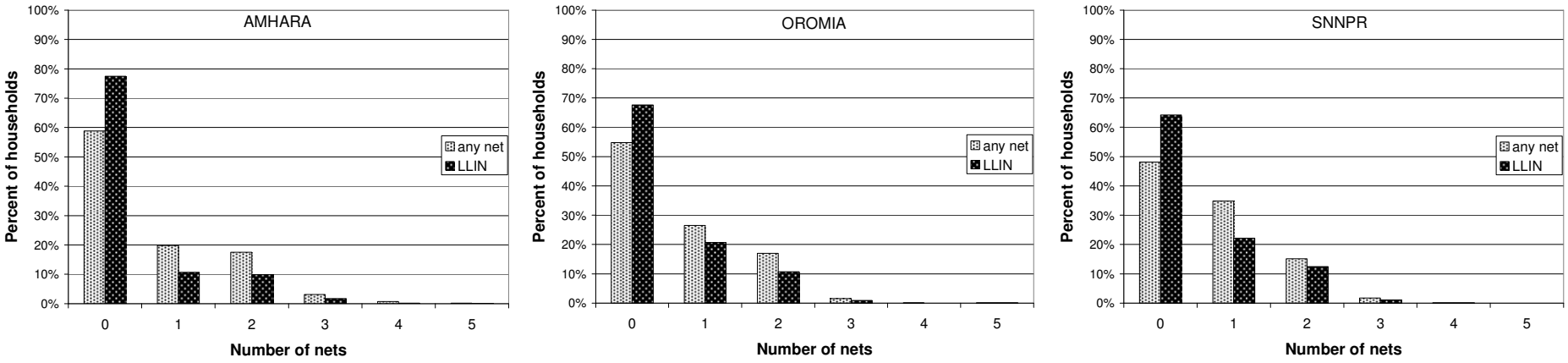


Figure 4.1.2: Proportion of households possessing at least one net or LLIN by region.

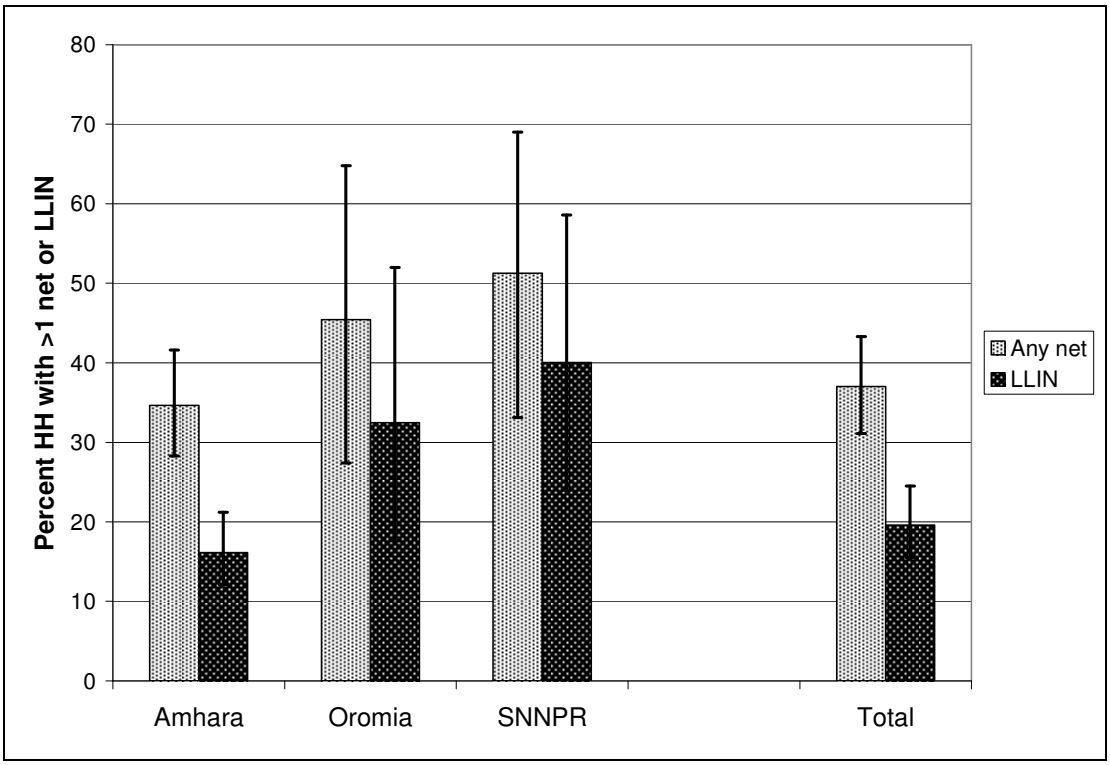


Figure 4.1.3: Mean number of nets and LLIN per household, by region

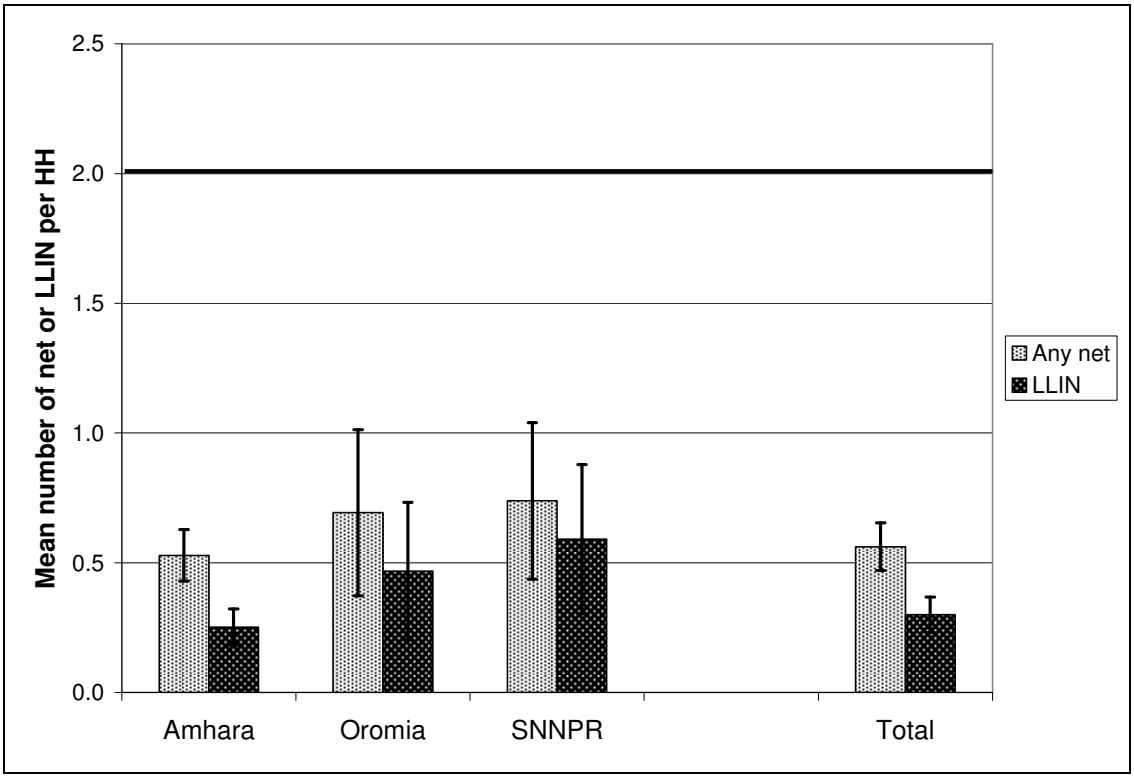
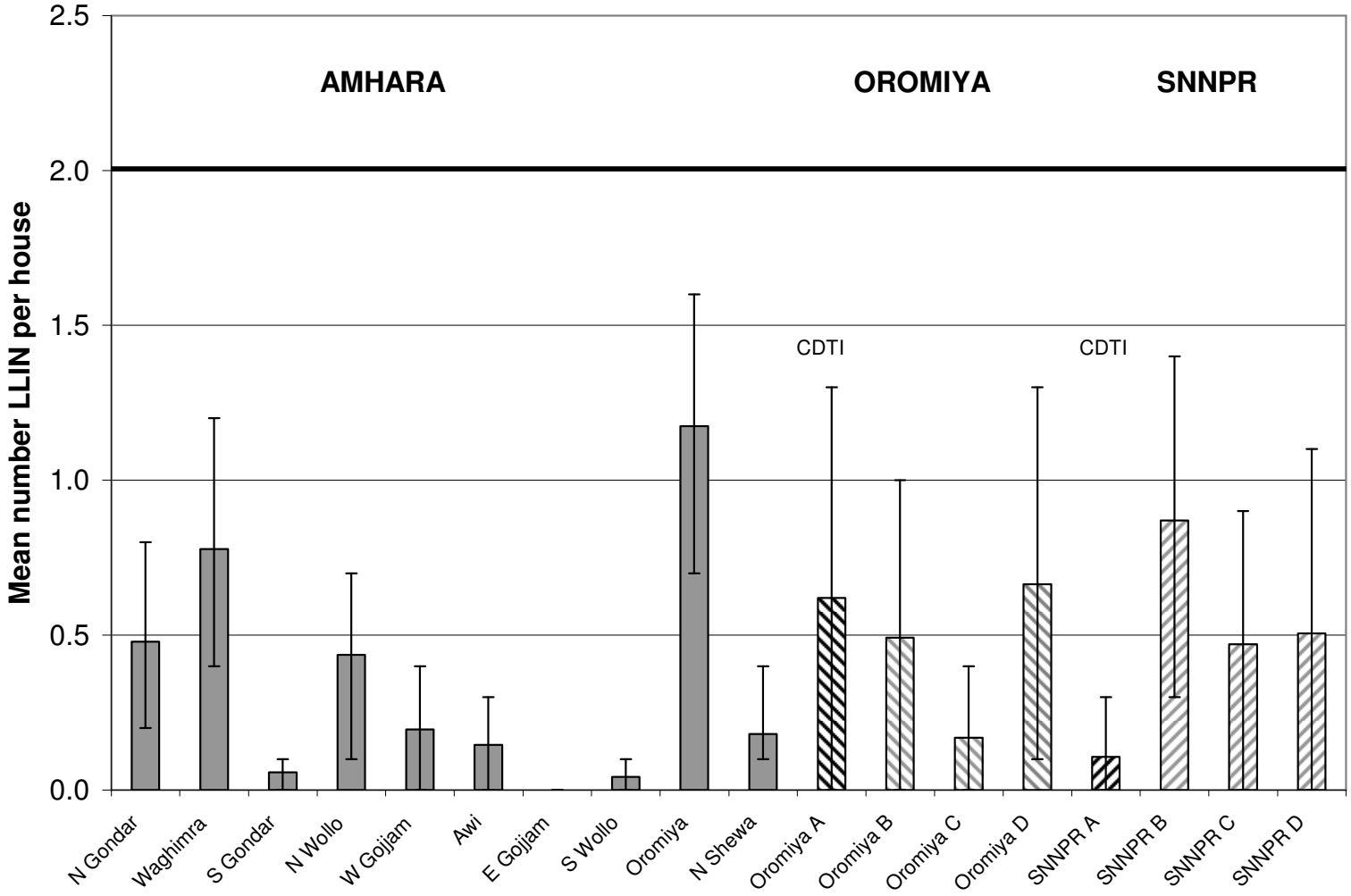

Mean number of net or LLIN per HH
2.5
2.0
1.5
1.0
0.5
0.0
Amhara
Oromia
SNNPR
Total
Any net
LLIN

Fig 4.1.4: Mean number of LLIN per household, by zone, quadrant and CDTI area, three regions.



4.2 Net use previous night

This section gives the proportions of three different population groups (all ages, children under five, and pregnant women) reporting that they slept under nets or LLIN last night, for each region in turn. Thus there are three tables for each region. This data was derived by direct questioning about who slept in each net in the household, and who slept without a net. The tables contain breakdowns for net usage by age (except pregnant women), gender (for all ages and under-fives only), zone or CDTI area, and altitude. For graphical summaries of the information for all three regions and overall, please see Figures 4.2.1 to 4.2 3 following the nine tables.

4.2.1 *AMHARA*

Table 4.2.1.1: Net use last night for all ages, by age group, sex, zone and altitude, Amhara.

Characteristic/ domain	Slept under net last night: Any net n	Any net %	LLIN n	LLIN %	Number of people N
Amhara region	6,120	25.8	3,390	12.5	19,059
Age					
<5 yrs	1,070	29.2	595	14.5	2,929
5-14 yrs	1,725	23.8	940	11.4	5,753
15-49 yrs	2,698	25.8	1,493	12.5	8,391
>=50 yrs	627	26.1	362	13.1	1,986
Sex					
Male	2,942	25.5	1,591	11.9	9,284
Female	3,178	26.0	1,799	13.1	9,775
Zone					
North Gondar	658	34.3	444	23.0	1,810
Waghemira	818	38.7	792	37.6	1,972
South Gondar	697	37.3	39	1.7	1,772
North Wollo	547	31.0	415	21.6	1,799
West Gojjam	404	21.3	170	8.5	1,789
Awi	436	15.5	217	7.4	1,950
East Gojjam	26	2.1	0	0.0	1,909
South Wollo	139	4.5	90	2.9	1,615
Oromia	2,067	91.7	1,041	48.3	2,269
North Shewa	328	14.3	182	8.7	2,174
Altitude					
<=1000m	142	59.7%	64	25.5%	302
>1000-1500m	1,378	54.7%	719	30.9%	2,123
>1500-2000m	3,298	40.3%	1,881	20.1%	7,469
>2000-2500m	1,289	12.4%	721	5.1%	7,685
>2500-3000m	13	0.7%	5	0.3%	1,274
>3000m	0	0.0%	0	0.0%	206

Table 4.2.1.2: Net use last night by under-five-year-old children, by age, sex, zone, and altitude, Amhara.

Characteristic/ domain	Slept under net last night				Number of children
	Any net		LLIN		
	n	%	n	%	N
Amhara region	1,070	29.2	595	14.5	2,929
Age (years)					
<1	156	30.1	93	15.5	421
1	193	32.6	95	14.2	494
2	249	31.6	138	15.6	624
3	240	25.4	138	13.2	721
4	232	28.0	131	14.3	669
Sex					
Male	568	29.7	305	13.8	1,513
Female	502	28.7	290	15.2	1,416
Zone					
North Gondar	129	38.7	90	27.4	310
Waghemira	143	45.5	140	43.9	304
South Gondar	107	39.0	8	2.4	256
North Wollo	83	31.8	60	20.6	272
West Gojjam	65	24.3	29	10.4	255
Awi	86	18.1	40	7.2	334
East Gojjam	8	4.0	0	0.0	301
South Wollo	18	4.1	9	2.1	226
Oromia	390	97.1	197	51.1	403
North Shewa	41	14.8	22	8.6	268
Altitude					
<=1000m	25	56.6%	10	25.9%	53
>1000-1500m	235	57.4%	117	30.2%	352
>1500-2000m	592	46.0%	340	23.5%	1,161
>2000-2500m	217	14.0%	128	6.1%	1,145
>2500-3000m	1	0.4%	0	0.0%	178
>3000m	0	0.0%	0	0.0%	40

Table 4.2.1.3: Net use last night by pregnant women aged 15 to 49 years, by zone and altitude, Amhara.

Characteristic/ domain	Slept under net last night				Pregnant women
	Any net		LLIN		
	n	%	n	%	N
Amhara region	126	33.6	67	14.6	315
Zone					
North Gondar	12	62.4	8	38.1	19
Waghemira	34	78.8	32	77.3	44
South Gondar	21	59.5	1	2.0	35
North Wollo	0	0.0	0	0.0	15
West Gojjam	11	27.3	7	18.5	35
Awi	7	10.6	3	4.1	53
East Gojjam	1	6.4	0	0.0	24
South Wollo	6	14.7	2	4.8	24
Oromia	29	96.5	13	43.6	30
North Shewa	5	12.6	1	3.5	36
Altitude					
<=1000m	3	80.9%	1	19.1%	4
>1000-1500m	23	64.7%	13	34.5%	33
>1500-2000m	73	49.4%	35	18.7%	131
>2000-2500m	27	15.7%	18	8.8%	130
>2500-3000m	0	0.0%	0	0.0%	15
>3000m	0	0.0%	0	0.0%	2

Notable points from the Amhara data include the fact that the proportions sleeping under a net or LLIN the previous night do not vary greatly between all ages, under fives and pregnant women. There was also no difference by gender in the proportion sleeping under nets. Net use showed little variation by age group. These observations suggest that no priority is being given to children or pregnant women.

4.2.2 *OROMIA*

Table 4.2.2.1: Net use last night by all ages, by age group, sex, CDTI area and altitude, Oromia.

Characteristic/ domain	Slept under net last night				Number of people
	Any net		LLIN		
	n	%	n	%	N
Oromia	1,421	35.8	926	23.5	4,428
Age					
<5 yrs	304	39.5	193	24.6	830
5-14 yrs	443	35.4	277	23.1	1,423
15-49 yrs	564	34.5	376	22.9	1,823
>=50 yrs	110	34.7	80	25.3	352
Sex					
Male	676	34.7	435	22.3	2,182
Female	745	36.8	491	24.7	2,246
CDTI					
Yes	278	32.2	269	30.8	1,158
No	1,143	36.3	657	22.4	3,270
Altitude					
<=1000m					0
>1000-1500m	75	3.3	72	3.3	721
>1500-2000m	992	41.0	509	19.5	3,055
>2000-2500m	354	50.0	345	48.6	652
>2500-3000m					0
>3000m					0

Table 4.2.2.2: Net use last night by under-five-year-old children, by age group, sex, CDTI area and altitude, Oromia Region.

Characteristic/ domain	Slept under net last night				Number of children
	Any net		LLIN		
	n	%	n	%	N
Oromia region	304	39.5	193	24.6	830
Age (years)					
<1	46	42.7	30	28.3	121
1	59	46.2	38	24.9	134
2	76	41.9	47	25.9	197
3	66	36.6	42	24.4	195
4	57	33.7	36	20.6	183
Sex					
Male	158	40.9	92	23.5	416
Female	146	38.2	101	25.7	414
CDTI area					
CDTI	56	35.8	55	35.7	189
Non-CDTI	248	39.9	138	23.4	641
Altitude					
<=1000m					0
>1000-1500m	22	5.0	21	4.9	163
>1500-2000m	217	47.8	108	21.5	559
>2000-2500m	65	55.4	64	54.3	108
>2500-3000m					0
>3000m					0

Table 4.2.2.3: Net use last night by pregnant women aged 15 to 49 years, by zone, CDTI area and altitude, Oromia region.

Characteristic/ domain	Slept under net last night				Number of pregnant women
	Any net		LLIN		
	N	%	n	%	N
Oromia region	31	41.0	23	29.2	87
CDTI area					
CDTI	8	41.6	8	41.6	26
Non-CDTI	23	40.8	15	27.1	61
Altitude					
<=1000m					0
>1000-1500m	4	9.1	4	9.1	17
>1500-2000m	25	50.5	17	33.1	66
>2000-2500m	2	50.4	2	50.4	4
>2500-3000m					0
>3000m					0

A rather paradoxical result is seen in Oromia region in that in all three tables, there is an increasing tendency with altitude for people to have slept under a net last night. This contradicts the accepted wisdom that risk (and presumably mosquito numbers) are higher at lower altitudes. This may be due to timing of net distribution prior to the survey i.e. possibly some areas at higher altitudes have already received nets while other lower areas have not yet.

While there is no difference between CDTI and non-CDTI areas in Oromia in the percent sleeping under any type of net, the proportion of people sleeping under LLIN was lower in the non-CDTI compared to CDTI areas.

4.2.3 *SNNPR*

Table 4.2.3.1: Net use last night by all ages, by age group, sex, CDTI area and altitude, SNNPR.

Characteristic/ domain	Slept under net last night				Number of people
	Any net		LLIN		
	n	%	n	%	N
SNNPR	1,404	34.7	1,066	28.3	4,397
Age					
<5 yrs	247	41.5	183	31.9	628
5-14 yrs	369	27.4	298	23.5	1,522
15-49 yrs	662	36.7	499	29.7	1,940
>=50 yrs	126	44.4	86	36.0	307
Sex					
Male	690	33.9	529	28.1	2,205
Female	714	35.5	537	28.4	2,192
CDTI					
Yes	158	9.4	52	3.6	944
No	1,246	38.3	1,014	31.8	3,453
Altitude					
<=1000m					0
>1000-1500m	294	50.9	150	37.6	775
>1500-2000m	984	33.7	797	27.5	3,205
>2000-2500m	126	24.9	119	23.7	417
>2500-3000m					0
>3000m					0

Table 4.2.3.2: Net use last night by under-five-year-old children, by age group, CDTI area and altitude, SNNPR

Characteristic/ domain	Slept under net last night				Number of children
	Any net		LLIN		
	n	%	n	%	N
SNNPR	247	41.5	183	31.9	628
Age (years)					
<1	31	40.3	18	24.7	77
1	47	51.2	37	42.1	96
2	59	42.7	43	31.6	139
3	55	36.1	45	29.8	163
4	55	40.2	40	31.6	153
Sex					
Male	119	38.2	85	28.0	317
Female	128	44.6	98	35.7	311
CDTI area					
CDTI	20	9.9	7	3.3	106
Non-CDTI	227	45.5	176	35.5	522
Altitude					
<=1000m					0
>1000-1500m	42	57.3	23	42.6	93
>1500-2000m	181	41.0	140	31.5	467
>2000-2500m	24	29.1	20	24.5	68
>2500-3000m					0
>3000m					0

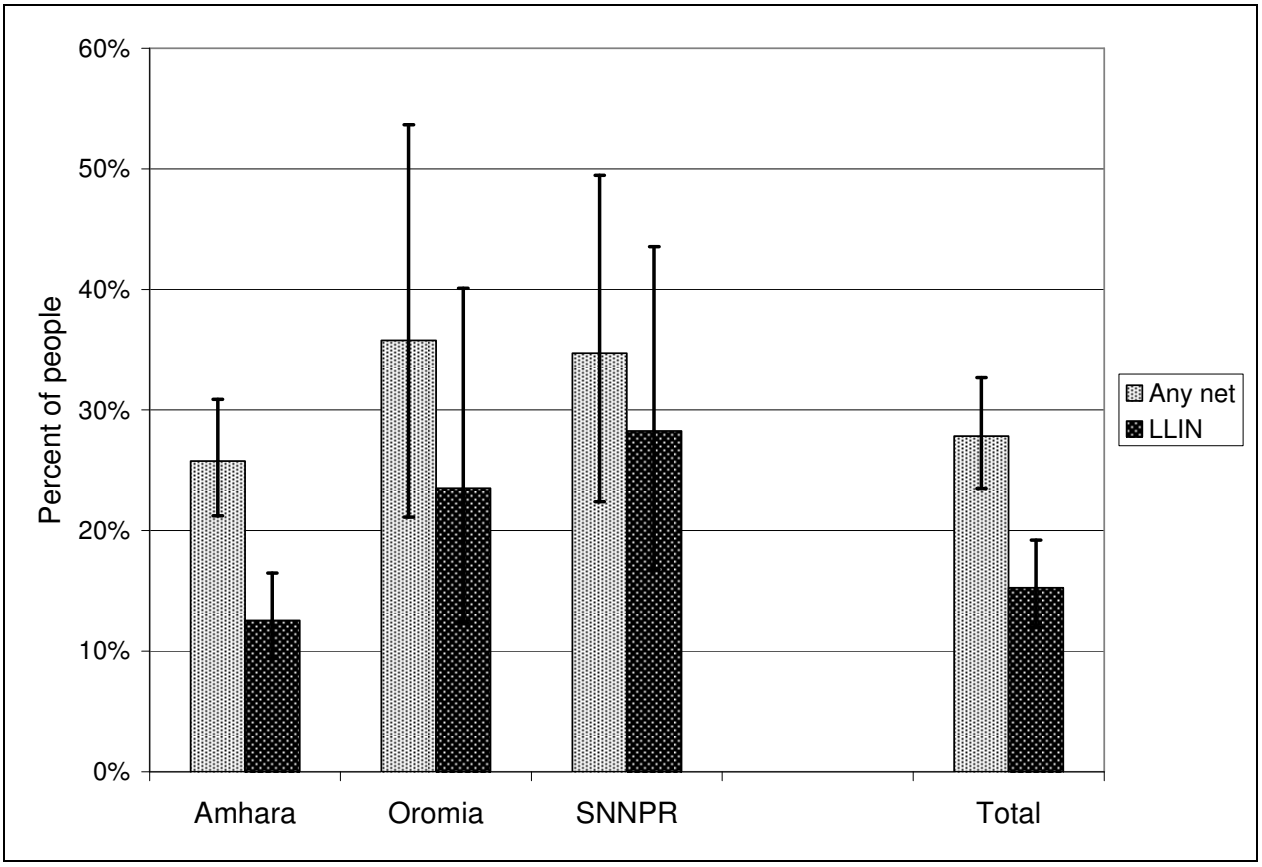
Table 4.2.3.3: Net use last night by pregnant women aged 15 to 49 years, by zone and altitude, SNNPR

Characteristic/ domain	% Slept under net last night				Number of pregnant women
	Any net		LLIN		
	n	%	n	%	N
SNNPR	37	46.4	28	36.9	87
CDTI area					
CDTI	2	10.3	0	0.0	21
Non-CDTI	35	53.1	28	43.8	66
Altitude					
<=1000m	0		0		0
>1000-1500m	5	52.2	0	0.0	17
>1500-2000m	30	48.9	26	43.4	63
>2000-2500m	2	19.7	2	19.7	7
>2500-3000m	0		0		0
>3000m	0		0		0

In SNNPR, we see a much lower probability that persons in CDTI areas have slept under a net or LLIN the previous night. Unlike Oromia, the relationship of any net use to altitude shows the expected declining trend, except in pregnant women where the sample numbers are small.

4.2.4 *ALL REGIONS*

Figure 4.2.1: Proportion of people of all ages using a net or LLIN last night, by region.



Overall, 27.8% (95% CI 23.5 – 32.7) of people of all ages slept under a net the previous night and 15.3% (95% CI 12.0-19.2) slept under an LLIN (Fig 4.2.1).

Like the results for household net ownership (see Figs 4.1.2 and 4.1.3 above), it appears that LLIN use by individuals in Amhara (Fig 4.2.1) is lower than in SNNPR, with Oromia intermediate.

As in each region, there is a slight increase in the overall proportion of under fives (Fig 4.2.2) and pregnant women (Fig 4.2.3) using nets the previous night. Priority to these vulnerable groups is not very evident in the results.

Figure 4.2.2: Proportions of children under five using a net or LLIN last night, by region.

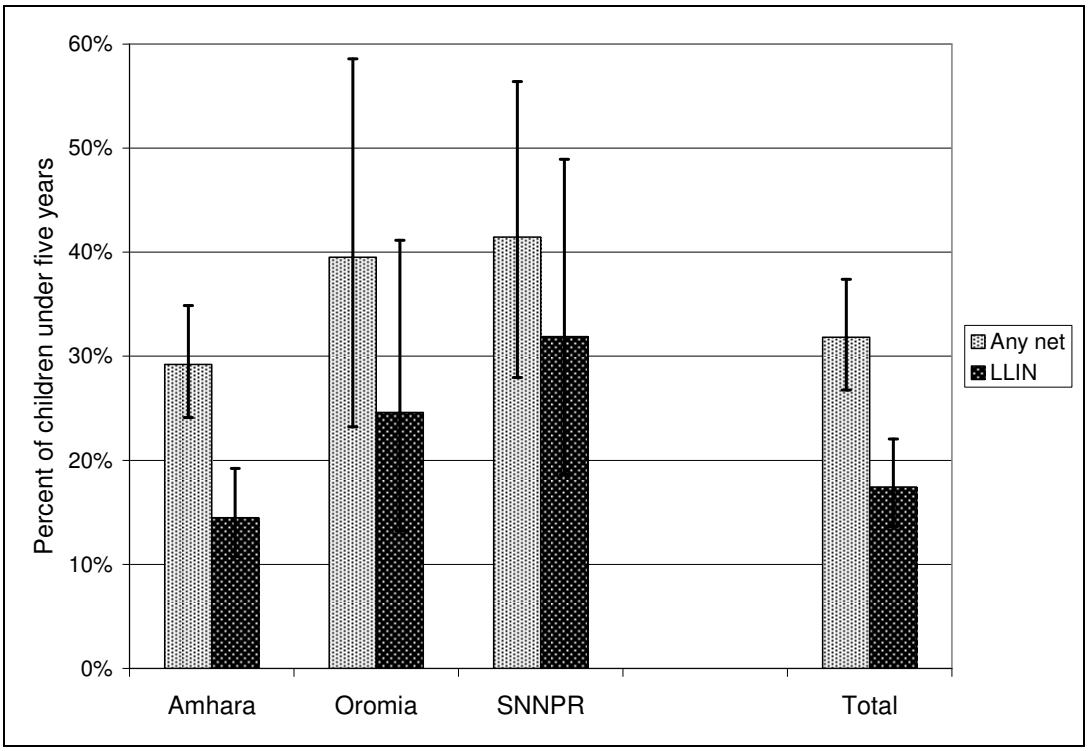
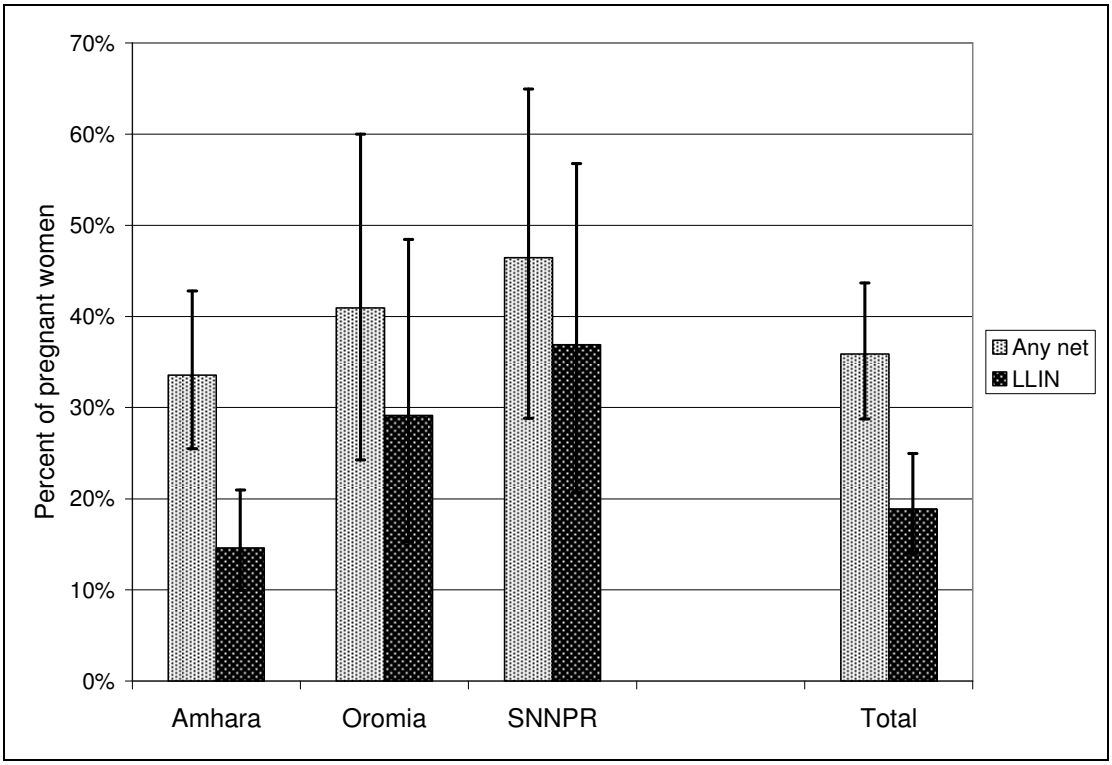


Figure 4.2.3: Proportions of pregnant women using a net or LLIN last night, by region.



4.3 Spraying

During the household section of the survey, respondents were asked if and when each room in their house was last sprayed with a residual insecticide. The proportion of the walls in each room sprayed was also noted. However, most houses had only one room used for sleeping, and in general, if one room was sprayed they all were. We report here in Table 4.3.1 to 4.3.2 by region, zone or CDTI area, and altitude, the results for the main sleeping room in the house.

We did not ask about the insecticide used; however Ethiopia uses primarily DDT in its spraying program.

Table 4.3.1: Households sprayed with residual insecticide, by zone and altitude, Amhara region.

Characteristic/ domain	Households sprayed at least once				Number of HHs
	Within last 12 months		0-6 months		
	n	%	n	%	N
Amhara region	686	14.8	271	4.8	4,101
Zone					
North Gondar	65	9.8	26	3.5	392
Waghemira	25	8.4	2	0.7	410
South Gondar	62	13.6	23	4.8	415
North Wollo	37	16.6	1	0.2	404
West Gojjam	109	24.5	36	7.6	400
Awi	54	13.7	33	6.1	395
East Gojjam	36	8.8	5	1.6	459
South Wollo	21	2.5	16	1.9	403
Oromia	239	57.4	96	20.1	400
North Shewa	38	9.3	33	8.1	423
Altitude					
<=1000m	20	15.9%	10	8.2%	68
>1000-1500m	261	49.6%	113	17.5%	419
>1500-2000m	321	23.2%	105	5.7%	1,559
>2000-2500m	84	5.8%	43	2.9%	1,705
>2500-3000m	0	0.0%	0	0.0%	307
>3000m	0	0.0%	0	0.0%	43

The results from Amhara (Table 4.3.1) indicate that a higher proportion of houses at altitude 1000-1500m were sprayed compared to those at lower and higher altitude. This may represent a policy of more spraying in so-called 'epidemic-prone areas', since areas below 1000m may have more stable transmission. If so, this policy should be questioned given the higher prevalence below 1000m and the likely necessity of multiple control measures. In addition, altitudes above 1500m are also epidemic prone. Lower spraying coverage may also result from logistical reasons such as remoteness and sparse populations living below 1000m.

Table 4.3.2: Households sprayed with residual insecticide, by quadrant, CDTI area, and altitude, Oromia region.

Characteristic/ domain	Households sprayed at least once				Number of HHs
	In last 12 months		In last 6 months		
	n	%	n	%	N
Oromia region	152	18.6%	87	8.8%	809
Quadrant					
A (CDTI)	78	44.3%	58	38.2%	200
B	10	8.2%	10	8.2%	201
C	58	32.3%	19	8.4%	208
D	6	3.9%	0	0.0%	200
CDTI area					
CDTI	78	44.3%	58	38.2%	200
Non-CDTI	74	15.1%	29	4.8%	609
Altitude					
<=1000m	0		0		0
>1000-1500m	51	37.8%	28	4.6%	130
>1500-2000m	95	18.5%	57	14.3%	548
>2000-2500m	6	4.6%	2	1.0%	131
>2500-3000m	0		0		0
>3000m	0		0		0

In Oromia, a higher proportion of houses in CDTI areas were sprayed compared to non-CDTI areas (Table 4.3.2). This is particularly obvious when spraying within the last 6 months is considered. However, this may relate to the timing of the survey in relation to the usual spray rounds which would occur just prior to the transmission season.

4.3.3: Households sprayed with residual insecticide, by quadrant, CDTI area, and altitude, SNNP region.

Characteristic/ domain	Households sprayed at least once				Number of HHs
	In last 12 months		In last 6 months		
	n	%	n	%	N
SNNPR	136	18.3	79	12.6	798
Quadrant					
A (CDTI)	24	10.2	0	0.0	200
B	36	10.4	19	5.4	199
C	15	7.6	14	6.9	199
D	61	35.3	46	28.8	200
CDTI area					
CDTI	24	10.2	0	0.0	200
Non-CDTI	112	19.7	79	14.7	598
Altitude					
<=1000m	0		0		0
>1000-1500m	31	20.9	4	3.3	150
>1500-2000m	105	20.4	75	15.6	570
>2000-2500m	0	0.0	0	0.0	78
>2500-3000m	0		0		0
>3000m	0		0		0

In SNNPR (Table 4.3.3), we see the opposite pattern from Oromia in the CDTI/non-CDTI areas, in that there was more spraying in the non-CDTI areas.

In general, the proportions of households sprayed were similar between regions (Figure 4.3.1). Overall the proportion of houses sprayed within the last 6 months was 5.7% and within the last 12 months was 15.5%. A breakdown of coverage within the last 12 months by zone or quadrant is shown in Fig 4.3.2.

Table 4.3.1: Proportion of households sprayed at least once, by region and time of last spraying.

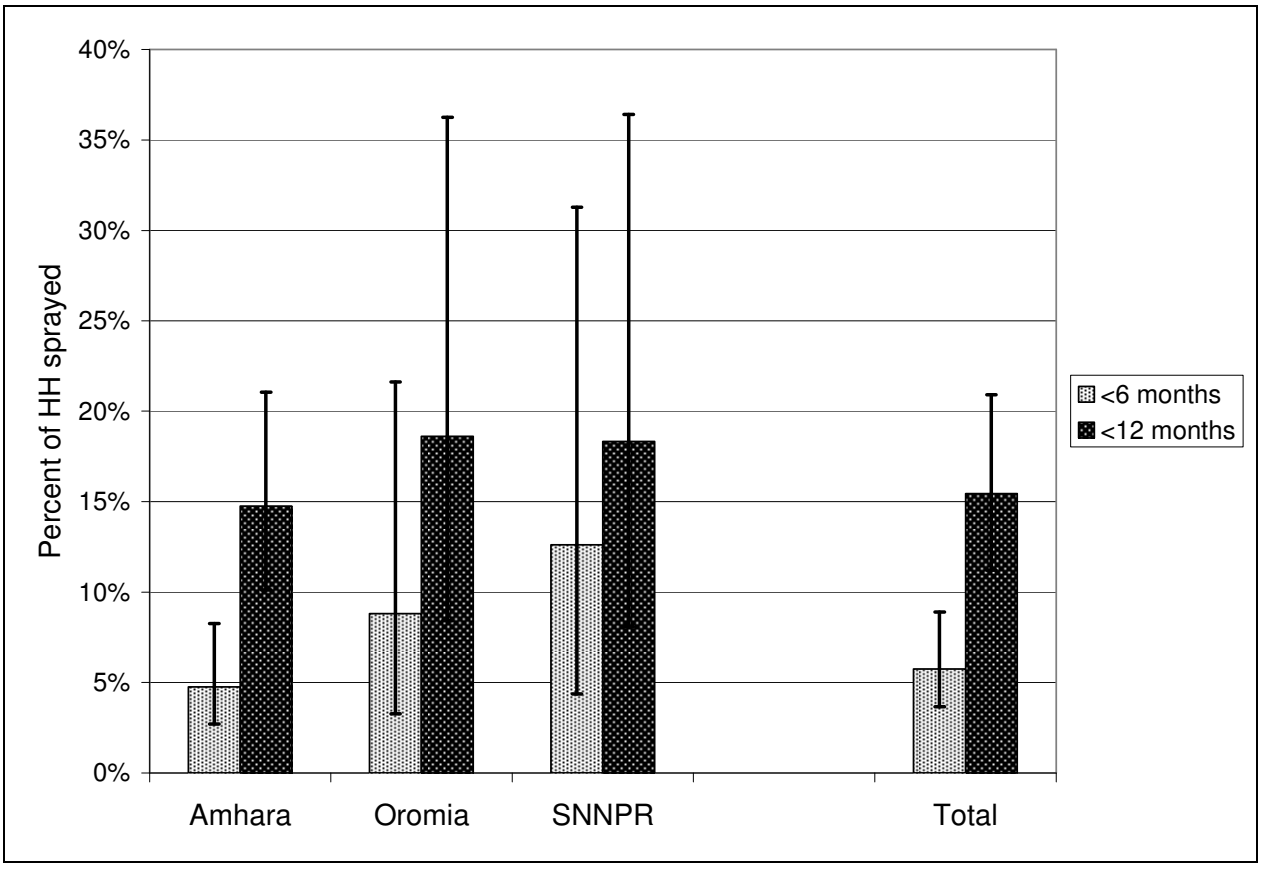
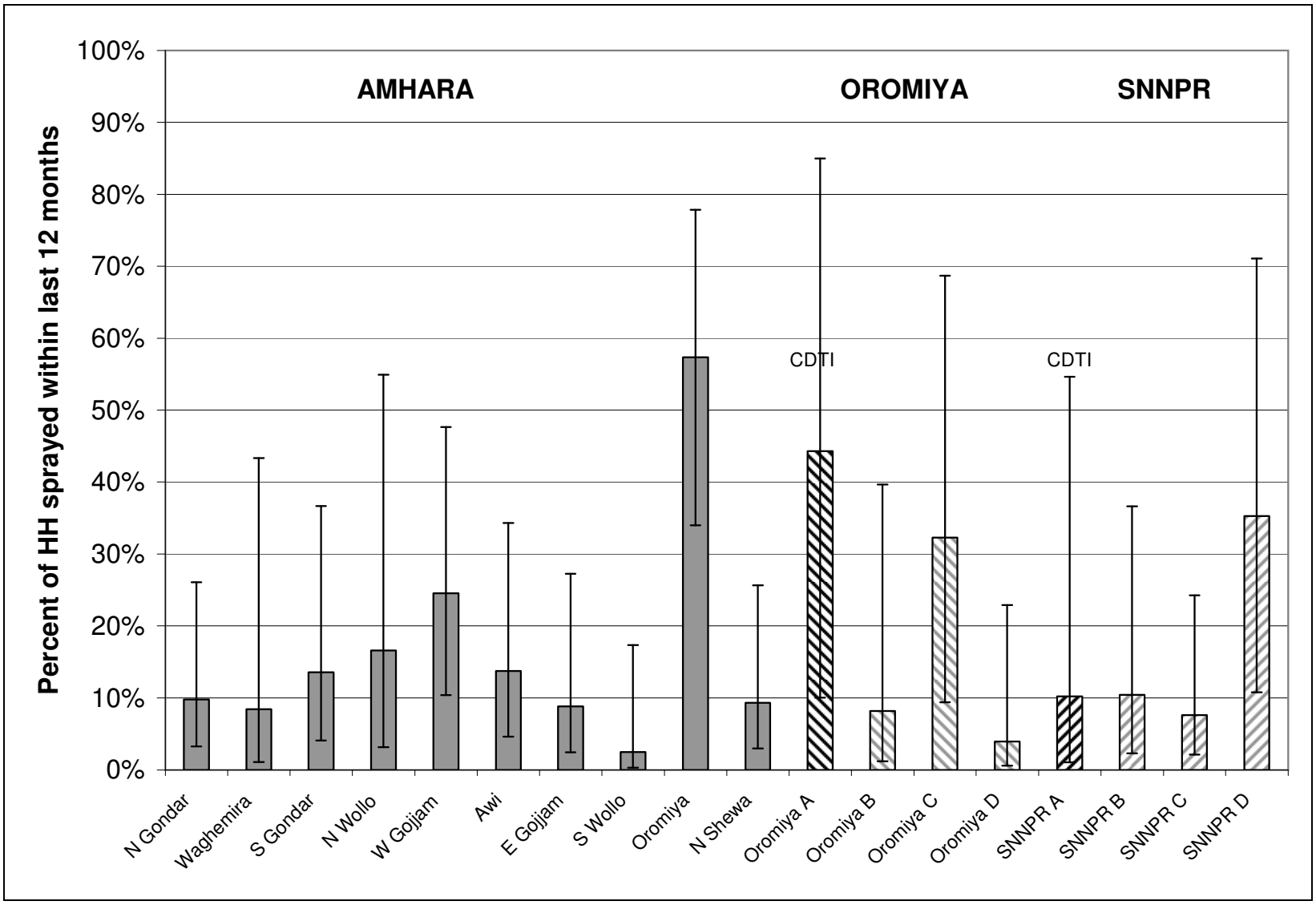


Fig 4.3.2 Households sprayed with residual insecticide within last 12 months, by zone, quadrant or CDTI area, three regions.



5. Trachoma prevalence

All persons living in sampled households in Amhara were eligible for examination for trachoma signs. Results are reported by the standard grading scheme of Thylefors et al (1987) and by the accepted age-groups of TF in children 1-9 years and TT in adults 15 years and over, as well as by additional categories.

In Amhara, the overall prevalence of TF in children aged 1-9 years was 32.7% (95% CI 29.2–36.5) (Table 5.1). Prevalence of TF in children by zone ranged from 12.6% (95% CI 7.8-19.7) in South Wollo to 60.1% (95% CI 50.4-69.0) in Waghimra. There was no sex difference in TF prevalence: Odds Ratio (OR) =1.0 (95% CI 0.9–1.2).

The overall prevalence of TT in persons aged 15 years and above was 6.2% (95% CI 5.3–7.4) (Table 5.1). Point estimates by zone of TT prevalence in adults ranged from 2.4% (95% CI 1.4-4.1) in Oromia zone to 10.0% (95% CI 6.3-15.6) in West Gojjam. After adjusting for age, adult women were three times more likely to have TT than men: OR=3.1; (95% CI 2.3–4.1).

Trichiasis was also observed in children aged less than 15 years with an overall prevalence of 0.3% (95% CI 0.2–0.5) in the age group 0-14 years, ranging from 0% in North Gondar to 0.8% (95% CI 0.3-1.8) in North Wollo (Table 5.1).

The age and sex-specific pattern of all trachoma signs is given in Fig 5.1.

Estimates of trichiasis burden are summarized in Table 5.2. The number of people with TT in Amhara was estimated to be 643,904 (lower and upper bounds=419,274–975,635). Consistent with the increased odds of TT in women, the TT burden in females (of all ages) was estimated to be 2.2 fold compared to males. For planning purposes, the number of persons requiring corrective trichiasis surgery in Amhara was estimated to be 645,000.

Table 5.1: Key trachoma prevalence indicators: trachomatous inflammation – follicular (TF) and trachomatous trichiasis (TT)

Domain	TF in children aged 1-9 years			TT in children aged 0-14 years			TT in people aged 15 and above		
	Number examined	Prevalence		Number examined	Prevalence		Number examined	Prevalence	
		%	95% CI		%	95% CI		%	95% CI
Amhara Region	5,485	32.7	29.2-36.5	8,121	0.3	0.2-0.5	9,121	6.2	5.3-7.4
Zones									
North Gondar	466	34.7	24.4-46.8	700	0		730	4.3	2.8-6.6
Waghemira	581	60.1	50.4-69.0	918	0.5	0.2-1.5	1,030	6.3	3.9-9.9
South Gondar	589	28.9	20.1-39.6	887	0.1	0.01-0.4	904	3.8	2.5-5.7
North Wollo	539	51.9	35.4-68.0	739	0.8	0.3-1.8	971	9.4	7.2-12.1
West Gojjam	500	33.1	25.3-42.0	774	0.4	0.1-1.3	874	10.0	6.3-15.6
Awi	588	38.9	22.7-57.9	866	0.1	0.01-0.4	893	5.4	4.0-7.3
East Gojjam	548	48.3	44.4-52.2	798	0.3	0.1-0.8	881	7.1	5.4-9.4
South Wollo	484	12.6	7.8-19.7	701	0.3	0.1-1.4	931	3.2	2.2-4.6
Oromia	663	28.7	19.6-39.8	958	0.1	0.02-0.8	964	2.4	1.4-4.1
North Shewa	527	23.2	14.1-35.9	780	0.3	0.1-1.1	943	9.0	6.7-11.9

CI, confidence interval;

Figure 5.1: Trachoma prevalence by age group and gender, Amhara region

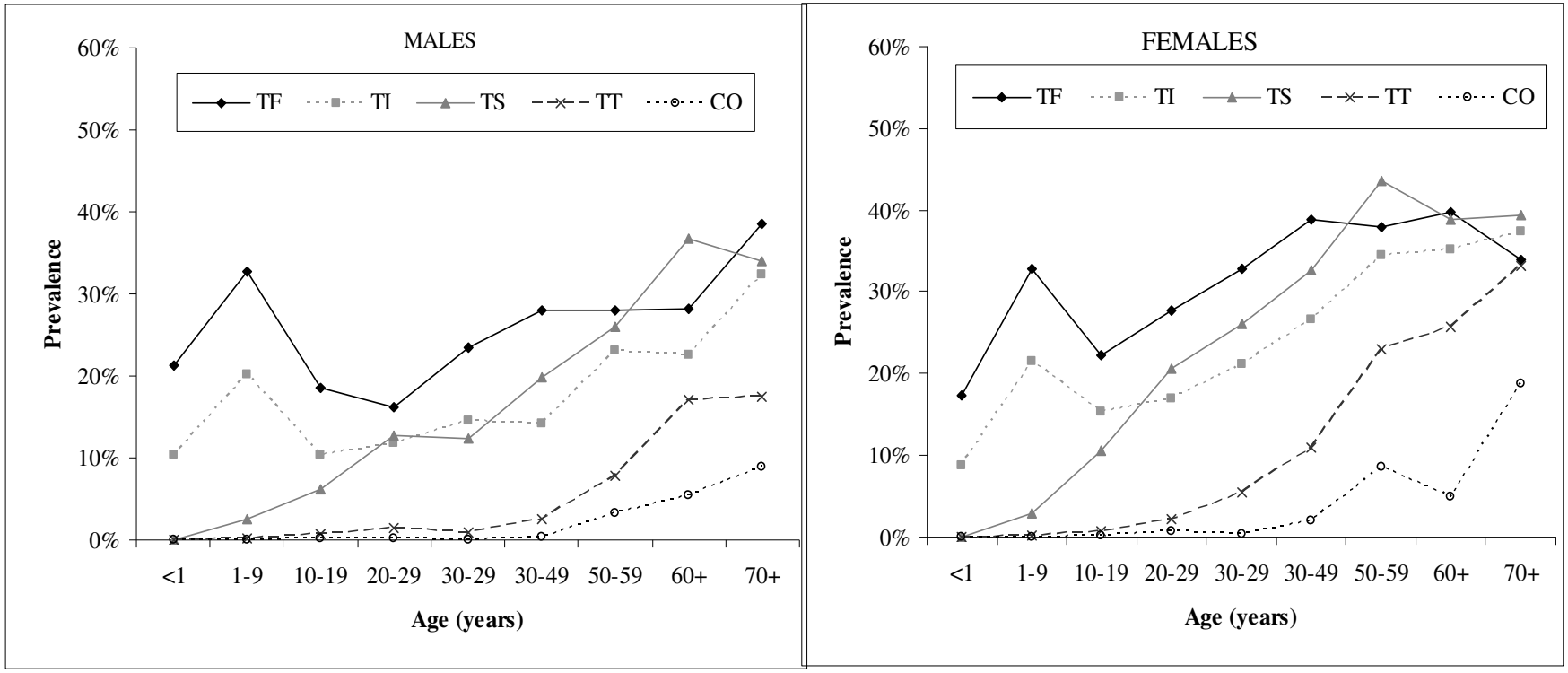


Table 5.2: Trichiasis burden estimates by gender

	Estimated population*			Estimated trichiasis burden								
				Male			Female			Total		
Domain	Male	Female	Total	Point estimate	Lower bound	Upper bound	Point estimate	Lower bound	Upper bound	Point estimate	Lower bound	Upper bound
Amhara Region	9,719,520	9,672,178	19,391,698	199,929	122,889	321,230	443,975	296,386	654,405	643,904	419,274	975,635
Zones												
North Gondar	1,636,753	1,604,408	3,241,161	21,996	13,378	35,843	49,669	31,605	76,663	71,665	44,984	112,506
Waghemira	189,369	186,072	375,440	4,716	2,807	7,773	10,127	6,391	15,581	14,844	9,198	23,354
South Gondar	1,146,949	1,096,528	2,243,477	15,579	9,285	25,908	35,344	22,278	55,051	50,923	31,563	80,960
North Wollo	821,324	815,374	1,636,699	29,631	19,314	44,762	63,163	45,666	86,186	92,795	64,980	130,948
West Gojjam	1,345,325	1,329,648	2,674,974	42,729	23,540	74,338	88,644	56,656	133,936	131,373	80,196	208,273
Awi	542,397	548,482	1,090,879	9,531	6,337	14,274	21,699	15,286	30,557	31,230	21,622	44,832
East Gojjam	1,225,067	1,244,993	2,470,060	24,751	16,195	37,634	56,644	39,415	80,682	81,395	55,610	118,316
South Wollo	1,418,240	1,460,730	2,878,970	17,353	10,214	29,286	44,541	28,447	68,778	61,893	38,662	98,064
Oromia	294,820	294,122	588,943	2,193	1,214	3,930	5,694	3,298	9,640	7,886	4,512	13,570
North Shewa	1,099,274	1,091,822	2,191,096	31,449	20,605	47,483	68,451	47,342	97,331	99,900	67,947	144,813

* Bureau of Finance and Economic Development for the year 2006/2007 (excludes Bahir Dar town, population 219,535)
Lower and upper bounds represents the 95% confidence interval of the point estimates. Point estimates and 95% CI adjusted for sampling design

6. Trachoma risk factors

The following Table 6.1 shows commonly accepted risk factors for trachoma which were determined at the individual level (unclean face in children 1-9 years) or the household level (water supply, latrines and house construction which is a proxy measure of socioeconomic status). These are presented descriptively here, but further analysis will explore their relationship to trachoma prevalence as determined in the survey.

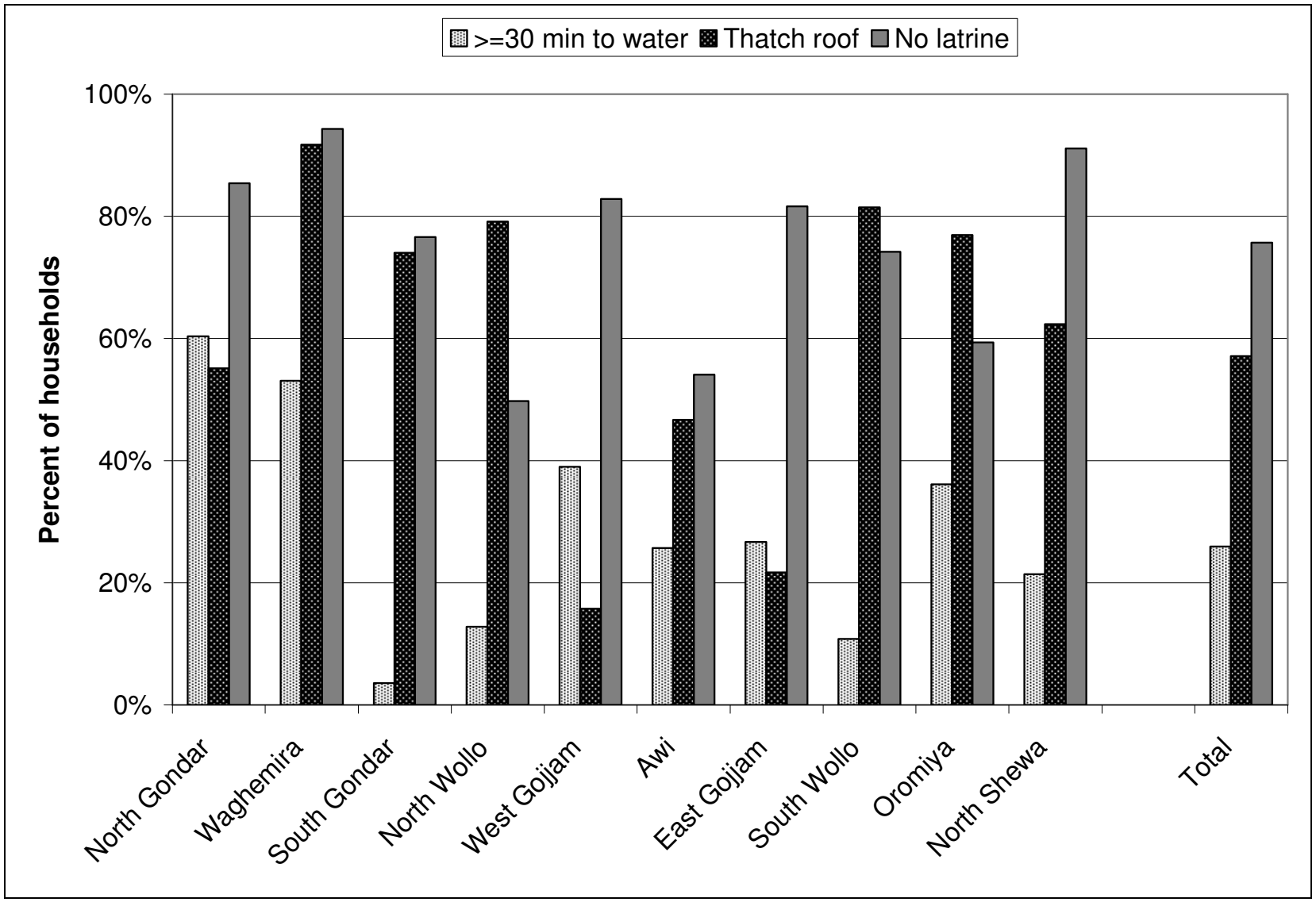
Unclean face in children and access to a latrine may also be considered as outcome indicators for the success of the SAFE prevention strategy for trachoma, and these indicators will be used in future evaluations.

The large variation by zone in these factors is clear in Fig 6.1.

Table 6.1: Trachoma risk factors, by zone, Amhara region.

Characteristic		North Gondar	Waghimra	South Gondar	North Wollo	West Gojjam	Awi	East Gojjam	South Wollo	Oromia	North Shewa	Total
Un-clean face in children 1-9 years	%	18.8%	53.6%	24.1%	32.9%	25.3%	74.9%	42.8%	3.2%	22.2%	23.7%	25.9%
Time to water source >= 30 minutes	%	60.3%	53.1%	3.6%	12.8%	39.0%	25.7%	26.7%	10.8%	36.1%	21.4%	25.9%
No pit latrine (open defecation)	%	85.4%	94.3%	76.6%	49.8%	82.8%	54.1%	81.6%	74.2%	59.4%	91.1%	75.7%
Households with thatch roof	%	55.1%	91.7%	74.0%	79.1%	15.8%	46.7%	21.7%	81.5%	76.9%	62.4%	57.1%

Figure 6.1: Household risk factors for trachoma, by zone and overall.



Lessons learned

Planning and timeline

It would have been better to have had more time to prepare and to do the survey earlier in the malaria season. However the vast amount of useful information suggests that it is better to go ahead and do such a survey even if all logistical issues are not perfect.

Planning for large amounts of protected storage spaces for nets and appropriate storage for rapid diagnostic tests (avoiding high temperatures) are crucial aspects that could be improved. Problems with the first batch of RDTs obtained quickly in country suggest that their storage had not been optimal.

Sampling

Cluster selection was rather complicated and in multiple stages: within each zone in Amhara it was woreda (8 selected), kebele (2), state team (5) and household (5). In Oromia and SNNPR the regions were first divided into quadrants, with one quadrant in each case being the CDTI areas. Then kebeles were selected directly without the woreda selection stage.

The kebele was regarded as the cluster, but then five state teams were selected within the kebele. Unfortunately, no record was kept of the number of state teams within each kebele, from which the five were selected, which meant that weighting for probability of selection at this stage was not possible. Although this information was available for Amhara kebeles afterwards, it would have been better to track it at the time. Exploratory analysis with and without weighting for the kebeles with known total numbers of state teams in Amhara showed that it made little difference in practice.

The same issue applies to households within a state team, which were selected by random direction (spin the pen or bottle). Without knowledge of the total number of households in the state team, it is not possible to weight the sampling at this stage (although this is not critical, since state teams are units of roughly equal size).

Selecting even-numbered households for blood slides from clusters of 25 always meant that 12 HH were selected (slightly less than half). An even number of HH per cluster would have avoided this problem. Use of the random-walk method is often criticized as it may be subject to bias and it does not allow weighting for household selection. Sketch mapping and segment selection is preferable.

Questionnaire design

There were inconsistencies between the numbers of individuals sampled for nets, trachoma and malaria. All lists included some individuals not represented on the other lists. It would have been preferable to make a total listing of household members and assign them unique numbers at the beginning of the survey. The present design was driven by a desire to know in which room people were sleeping and to see all nets in each room. However, this could still be accomplished

after listing the resident individuals first.

There was no unique identifier number for the state team (the final unit of selection for groups of 5 households). Names of state teams were entered, but the challenges of translation from Amharic and inconsistent spellings made this unreliable. This meant many hours post-data entry spent on correcting these, inferring the correct spelling and which households belonged together using questionnaire sequence and the GPS data. Although analysis was not performed by state team, for mapping purposes and for investigating clustering in the data, it would have been ideal to give each state team a number at the time of selection.

Training

Supervisors and survey data collectors were given the same amount of training. In retrospect, it would have been better to give more extensive training to the supervisors. Once in the field, they had many questions about household selection which led to innumerable phone calls back to Addis for advice.

Whilst survey workers and supervisors had no problems understanding the protocol, more training and supervision would have been beneficial for emphasizing the importance of **following** the protocol correctly in the field.

Rapid diagnostic tests for malaria

Two different batches of rapid diagnostic test (RDT) were used. Results suggested that the older batch of RDTs, used in all of Amhara and in parts of Oromia/SNNPR, were not fully effective. No record was kept of the batch numbers used in each cluster, except that Oromia quadrant C was all done with the new batch. Recording of batch numbers is critical in case a problem is detected in some batches (as in this case). Quality control of the RDTs before starting is highly desirable.

GPS and mapping

More practice with the GPS units would have been desirable. A particular problem was that once a survey worker deviated from the correct sequence of steps on the GPS, they did not know how to return to start again. There needed to be more information given on what to do when an unexpected screen was reached, as they then tended to make changes in screens which should have been left untouched.

The mapping scheme to be used and the format of the coordinate system (meters or feet; degrees, minutes, seconds or degrees, minutes, decimal parts of a minute) should have been decided in advance so that the GPS units were set up correctly. This would have avoided later necessity for recoding.

Logistics

More GPS batteries were needed than anticipated and extra should be supplied. Because the surveys often extended into the evening hours, workers used the GPS unit light to enter data and exhausted the batteries more quickly than expected. In future flashlights and batteries should be supplied.

Data entry

Questionnaire design caused some problems with structuring the data for entry. It would have been better to first list the number of people in the house, the number of rooms and possibly number of nets. Double data entry does not seem to have caught all the errors in the data, perhaps because of use of the "autofill" function. Spelling of names was not consistent and there were many GPS coding and data entry errors which were not caught. Names of state teams were a particular problem and a number would have been better.

Conclusions and recommendations

An integrated malaria and trachoma survey was successfully conducted in 224 clusters and 5708 households in three regions of Ethiopia between December 2006 and early February 2007, at the end of the peak malaria season.

In Amhara National Regional State, 4,122 households were selected and 4,101 of those (99.5%) were surveyed. Net usage was assessed in 19,059 of the 19,669 persons participating (96.9%). Blood slides from 7,745 people of all ages living in even numbered households (84.7% of those eligible) were examined for malaria parasites, and 17,242 people were examined for trachoma signs (87.7% of those eligible).

In Oromia and SNNP Regions, 1,607 households were selected and all were surveyed. Net usage was assessed in 8,825 of the 8,974 persons participating (98.3%). Blood slides from 3,856 people of all ages living in even numbered households (81.7% of those eligible) were examined for malaria parasites. No trachoma survey was done in these two regions.

It was estimated that 37.0% (95% CI 31.1-43.3) of households possessed at least one net. The maximum number of nets owned was 5 and the median was 0. Only 19.6% (95% CI 15.5-24.5) owned at least one LLIN. The mean number of nets of any type was 0.6 per house and of LLIN 0.3 per house.

Overall, 27.8% (95% CI 23.5 – 32.7) of people of all ages slept under a net the previous night and 15.3% (95% CI 12.0-19.2) slept under an LLIN. The proportions were only slightly higher for under-five-year-olds (31.8% net and 17.4% LLIN) and pregnant women (35.9% net; 18.9% LLIN). There was no difference in net use by gender.

The overall average malaria prevalence in Ethiopia was low [4.1% (95% CI 3.4-4.9)] when assessed in December through February in 2006 to 2007. However, there was large variation between cluster and region. SNNPR had the highest overall prevalence and Oromia the lowest. There was no statistically significant variation in prevalence by age group or gender. There was a declining trend of prevalence by altitude from 7.3% at <1000m to 3.2% between 2500m and 3000m. Above 3000m, the prevalence was 7.3% (n=103) but this anomaly may be due to 6 out of 7 positive slides being clustered in one household.

An altitude of 2500m (sometimes 2000m) is often described as the limit of transmission in Ethiopia. However we found significant numbers of cases above this altitude. Although some of these cases may have resulted from local epidemics or from movement of people up from lower altitudes, it would be dangerous to exclude these areas from control efforts and surveillance.

Zonal trachoma prevalence in Amhara (trachomatous inflammation follicular [WHO grade TF] in children aged 1-9 years) ranged from 12.6% to 60.1%, with the overall state-wide prevalence being 32.7%. Amhara state-wide prevalence of trachomatous trichiasis (TT) in persons aged over fifteen was 6.2%, and 0.3% in children aged 0-14 years. Overall, an estimated 643,904 persons (lower bound 419,274, upper bound 975,635) in Amhara have TT and require immediate corrective surgery.

Recommendations:

In order to determine whether national targets for LLIN coverage (a mean of 2 per household in malarious areas) have been met, a follow up survey of mosquito net and LLIN coverage is recommended after completion of the country-wide LLIN distribution by August 2007. This survey should be conducted in October or November 2007 during the predicted peak malaria season. The results of the survey may indicate areas with gaps in coverage which should then be filled.

The net coverage results indicate that net priority is not being emphasized for children under five or pregnant women, and this needs to be addressed in communication materials.

The results obtained on malaria prevalence by cluster (kebele) should be used together with altitude, location and climate data, as well as other routine surveillance data to contribute towards improving the malaria risk stratification in the country and for targeting malaria control to the highest risk areas.

The results on spraying coverage, together with malaria prevalence information and routine surveillance data, should be used to assess the completeness and appropriate targeting of this intervention in order to improve its effectiveness.

For the purposes of The Carter Center programs, the results will inform planning for priority integrated interventions in areas which have a high prevalence of both malaria and the other target diseases (trachoma and onchocerciasis). Other information on onchocericasis distribution (from APOC mapping or other sources) will be needed for this in Oromia/SNNPR.

The trachoma results indicate that all zones in Amhara are above the threshold (>10% TF in children 1- 9 years) for urgent promotion of the SAFE strategy for prevention of trachoma. The malaria results indicate that all zones have malaria transmission in all age groups. Further analysis of the malaria data may provide information for targeting below zone level. Only one quarter of households currently have latrines. The number of eyelid surgeries needed is 645,000 just to deal with the current prevalence of trichiasis.

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Appendix A: Survey design and sampling

Ethiopia is a decentralized country and the administrative divisions in the areas we studied are as follows: Region, zone, woreda, kebele, gott or gari (state team).

Some woredas in SNNPR are designated as 'special woredas' and do not form part of a zone; they report directly to the regional health bureau. There are also separate urban areas of which Bahir Dar (Amhara region) is one.

There is a huge range of malaria transmission intensity and seasonality in Ethiopia, and some areas are too high for transmission. The policy of the FMOH is to distribute free LLIN in 'malarious areas'. The definition of malarious is determined at the kebele level, although the definition is not clear-cut and varies by region and over time. Woredas are also described as 'malarious', but this seems to be based on whether or not they have any malarious kebeles.

In designing the survey, we initially considered stratification by altitude or level of malaria risk (high, low and none). However, the information suitable to make this distinction was not readily available. As a compromise and to avoid unnecessary sampling in non-malarious areas, we decided to completely exclude woredas in which less than 10% of the population was at risk of malaria.

The survey design was different in Amhara from the other two regions. In Amhara we wished to determine prevalence of both malaria and trachoma, while in Oromia and SNNPR only malaria was to be studied. Also, the whole of Amhara region is included in the MALTRA project, and zone level estimates were desired in this region. Only the CDTI areas of the other two regions are the main focus. However, in these two regions we wished to be able to compare in future the success of the MALONCHO program in CDTI areas compared to non-CDTI areas. As a compromise between zone level estimates, we therefore decided to sample four strata (quadrants-groups of woredas or zones) in each of Oromia and SNNP regions, where one quadrant in each region comprised the CDTI woredas. By combining the four quadrants in each region, we also wished to be able to provide separate estimates of prevalence and net coverage for each region to the malaria control program.

Sample size

Sample size was estimated based on the assumption that prevalence of malaria would be the lowest indicator to be measured, and that the prevalence in the population would be 8%. In Amhara, each zone was regarded as a separate domain, while in Oromia and SNNPR, the CDTI areas combined were one domain and the remaining 3 quadrants in each region were two other domains.

Required sample size (n) per domain was estimated by the following formula:

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

- Expected malaria prevalence = 8% (0.08) (P)
- Level of significance 95% = Table value =1.96(Z)
- Acceptable error=2%(e)

Inserting these values in the above formula, gives 707 persons
Adding 10% for non-response ~~780 or 800 persons per domain
Multiply by design effect of 1.2 =960 ~~close to 1000 persons/domain

It is estimated that average household size is 5 persons
To get 1000 persons, we need to visit at least 200 households.

If cluster size is 25 households, and number of clusters per zone is 16, this would be 400 households per zone, half of which would be tested for malaria.

Thus we selected in Amhara:

- 8 woredas from each zone
- 2 kebeles equally from each woreda
- 5 state teams from each kebele
- 5 households from each state team

Giving 400 households/zone and a total of 4000 households in 160 clusters.
Out of 4000HHs, 2000HHs for RDTs/blood slides = 1000 people/zone and 10,000 total
Eye exam in all 400HHs = 2000/zone and 20,000 total.

Thus we selected in Oromia/SNNPR:

- 8 kebeles in each stratum (quadrant) (total 64 clusters)
- 5 state teams from each kebele
- 5 households from each state team

Giving 200 households per stratum and a total of 1600 households in 64 clusters
Out of 1600 households, 800 HH for RDT/blood slide = 500 people per stratum and 4000 total.
No eye exam was done in these regions.
CDTI areas (2 strata) would have 1000 people and non-CDTI areas (6 strata) would have 3000 people.

Households were selected for RDT/blood slide if the house number was even.

The procedure is summarized in Table A1.

Table A1: Sampling strategy in the three regions

Points of Similarities/Differences	Amhara	Oromia	SNNPR
▪ Malaria focused	Yes	Yes	Yes
▪ Trachoma focused	Yes	No	No
▪ Survey Design	Independent survey in each zone except Bahir Dar special zone. A total of 10 surveys	The region was stratified into four strata depending on: ▪ Geographical proximity ▪ CDTI and Non-CDTI areas and independent survey from each stratum	Same as Oromia
▪ Survey Design	Aimed at Zonal and Regional level estimates of Malaria and Trachoma	Aimed at comparative analysis of malaria prevalence between CDTI and non-CDTI areas as well as regional estimate	Same as Oromia
▪ Target Woredas	Woredas with over 10% of malarious population were eligible	Same as Amhara	Same as Amhara
▪ Sample size and No of clusters	▪ 8 Woredas from each Zone ▪ 2 Kebeles or clusters from each Woreda ▪ 25 HHs/cluster ▪ A total of 400 HHs/zone ▪ Blood Slide only from 200HHs/Zone	▪ 4 strata ▪ 8 clusters/stratum ▪ 32 cluster ▪ 25 HHs/cluster ▪ 800HHs/ Region ▪ Blood slide only from 400 HHs	Same as Oromia
▪ Sampling Methodology	▪ Multi stage ▪ Woredas as a primary sampling unit using systematic sampling technique[1] ▪ Within Woreda, Kebele/Cluster as a secondary sampling unit using the same method ▪ Within Kebele/Cluster State teams were selected randomly ▪ HHs were identified using random walk method	▪ No Woreda selection ▪ In each stratum (quadrant) Zones were classified and Kebeles under each Zone were listed alphabetically ▪ 8 Kebeles/Clusters from each stratum were selected using systematic sampling technique	Same as Oromia

[1] All woredas were included in the survey for Zones with less than 8 Woredas

Sampling frame and selection

The sampling frame was the rural population of three regions, Amhara, Oromia and SNNPR. Urban areas were excluded. We also excluded woredas with less than 10% population in malarious areas as mentioned above. Bahir Dar town and two woredas were excluded in Amhara; eight woredas in Oromia and four in SNNPR (including two special woredas) were excluded due to low malaria risk.

Amhara

In Amhara region, woreda was selected as the primary sampling unit using probability proportional to the size of malarious population. By zone, a list of woredas was obtained including total woreda population and proportion of malarious population. Woredas that have malarious population less than 10% were excluded. Woredas were arranged in alphabetical order and their population cumulated. The sampling interval (total population/8 (no of clusters)) was determined. A random number between 1 and the sampling interval was selected. The woreda in which the random number fell was the first sample. The sampling interval was added to the random number to get the second sample, and was added again until the 8 woredas were selected.

Kebele was the secondary sampling unit, taken from a list of malarious kebeles and their populations in the selected woredas using the same sampling method. The state teams as tertiary sampling unit were selected randomly by writing the state team names on pieces of paper and picking them out of a hat. This was done by survey team in the field.

The random walk method was applied to identify households for interview and other components of the survey. The survey staff went to the center of the state team and tossed a pen or bottle, then followed the direction of the pen or bottle to interview 5 households in each state team.

Oromia and SNNPR

In Oromia and SNNPR, kebele was the primary sampling unit and woredas were not selected as a first stage. First, a list of all woredas and malarious kebeles in the strata (quadrants) was prepared. Eight kebeles within each quadrant were selected by the method described above. The samples selected in each quadrant are shown in Table A2.

Table A2. List of zones and number of clusters sampled by quadrant, Oromia and SNNPR

	Number of clusters sampled								
	Oromia				SNNPR				
Zone/Special Woreda	A CDTI	B	C	D	A CDTI	B	C*	D**	Total HH
Illubabor	4	0							100
Jimma	4	2							150
West Wellega		4							101
East Wellega		2							50
Arsi			1						25
Bale			2						50
East Hararge			3						82
West Hararge			2						51
Borena				1					25
E Shewa				2					50
Guji				1					25
N Shewa				1					25
SW Shewa				1					25
W Shewa				2					50
Kefa					2				50
Bench-Maji					5				125
Sheka					1				25
Dawro						1			25
Gamo Goffa						2			49
Konso						1			25
South Omo						1			25
Wolaita						3			75
Derashe						0			0
Konta						0			0
Basketo						0			0
Amaro							1		25
Gedeo							2		50
Sidama							5		124
Gurage								3	75
Hadiya								2	50
Silte								2	50
Kambata-Timbaro								1	25
Alaba								0	0
Total clusters	8	8	8	8	8	8	8	8	64
Total households	200	201	208	200	200	199	199	200	1,607

* Burji special woreda in SNNPR C and Yem special woreda in SNNPR D were excluded from the sampling frame as non-malarious.

Sampling weights

Sampling weights were generated to adjust for the sampling designs and also to adjust for the population size.

Amhara sample

In Amhara, sampling probabilities were calculated for (a) woredas, (b) kebeles and (c) state teams. Sampling probabilities were then multiplied to generate a total sampling probability for each kebele based on these three stages (d). Sampling weights (e) were derived as the inverse of the overall sampling probability for each kebele.

- (a) Woreda sampling probability = woreda malarious population/total malarious population in zone
- (b) Kebele sampling probability = kebele malarious population /total malarious population in woreda
- (c) State team sampling probability = five state teams /number of state team in kebele
- (d) Overall selection probability at kebele level=a x b x c
- (e) Sampling weight at kebele level = 1/d

Oromia & SNNP sample

In Oromia & SNNP, sampling probabilities were calculated for kebeles only (f). Sampling probability for state teams were not calculated since data on the number of state teams for each kebele was not available. This should not impact the overall sampling weight markedly since state teams have roughly the same number of households (50). Sampling weights (g) were derived as the inverse of the overall sampling probability for each kebele.

- (f) Kebele sampling probability = kebele malarious population /total malarious population in woreda
- (g) Sampling weight at kebele level = 1/f

Limitations of sampling weights

The sampling weights above have limitations in that sampling probability for households was not available for either survey or for state teams in Oromia and SNNP. Overall, the assumption that the number of state teams per kebele and the number of households per state team is uniform across these levels partly overcomes this limitation. However, regarding the number of state teams per kebele, this ranged from nine to 70 in Amhara. It is possible that the number of households per state team differs markedly as well. Therefore in future surveys, estimating the sampling probability at the state team and household levels will greatly enhance calculation of more representative sampling weights.

Appendix B: Survey personnel

Survey management

The Carter Center Atlanta: Paul Emerson, Frank Richards, Patricia Graves, Aryc Mosher, Elizabeth Cromwell.

The Carter Center Addis Ababa: Teshome Gebre, Estifanos Biru, Tekola Endeshaw, Yeshewamebrat Ejigsemahu, Mulat Zerihun, Ayennew Messele, Sirgut Mulatu, Frew Demeke.

Field work teams

AMHARA
Overall supervision: Tesfaye Teferi, Gedeon Yohannes, Berhan Ayele, Mulat Zerihun, Ayennew Messele

Table B1: Amhara staff

	Name	Zone	Responsibility
1	Temesgen Assefa	Waghimra	Zonal Supervisor
2	Abebe Akinaw	Waghimra	Trachoma Grader
3	Zewdu Tibebeu	Waghimra	Interviewer
4	Haile Kidane	Waghimra	Lab Technician
5	Mulat Birhanu	Waghimra	Assistant interviewer
6	Getachew Kassie	Waghimra	Interviewer
7	Seyoum Desta	Waghimra	Lab Technician
8	Sr. Azawent Shemeles	Waghimra	Trachoma Grader
9	Tesfaye Teferi	North Wollo	Zonal Supervisor
10	Molla Seru	North Wollo	Interviewer
11	Seid Endris	North Wollo	Trachoma Grader
12	Yerom Sisay	North Wollo	Lab Technician
13	Zelalem Dessie	North Wollo	Lab Technician
14	Haymanot Balcha	North Wollo	Interviewer
15	Bizuneh Bekele	North Wollo	Trachoma Grader
16	Gedeon Yohannes	South Wollo	Zonal supervisor
17	Aschalew Alemu	South Wollo	Lab Technician
18	Gobezie Endris	South Wollo	Interviewer
19	Shemelese Adem	South Wollo	Trachoma Grader
20	Abrehet Yelak	South Wollo	Assistant Interviewer
21	Ahemed Muhamed	South Wollo	Interviewer
22	Hayleselasie Beyene	South Wollo	Trachoma Grader
23	Ahemed Awol	South Wollo	Lab Technician
24	Dawit Abebe	Oromia	Zonal supervisor
25	Abebe Muhamed	Oromia	Lab Technician
26	Seid Ahemed	Oromia	Trachoma Grader
27	Dereje Husen	Oromia	Interviewer

28	Abayneh Mulat	Oromia	Trachoma Grader
29	Melaku Tikuye	Oromia	Interviewer
30	Abebe Yemere	Oromia	Assistant Interviewer
31	Abetew Abera	Oromia	Lab Technician
32	Tadegegn Worku	North Shewa	Zonal supervisor
33	Birhanu Kebede	North Shewa	Interviewer
34	Wubeshet Zewudie	North Shewa	Lab Technician
35	Tariku Haylemariam	North Shewa	Trachoma Grader
36	Shawel Tessema	North Shewa	Trachoma Grader
37	Zemedie Emeru	North Shewa	Lab Technician
38	Abdu Ali	North Shewa	Interviewer
39	Muluken Asres	North Gondar	Zonal supervisor
40	Muhamed Endris	North Gondar	
41	Demeke Biazen	North Gondar	
42	Abere Agonafer	North Gondar	`
43	Bele Chane	North Gondar	
44	Amelete Mulaw	North Gondar	
45	Mamit Asefa	North Gondar	
46	Kassa Berhan	South Gondar	Zonal supervisor
47	Serkalem Mengistu	South Gondar	
48	Melashu Belew	South Gondar	
49	Andualem Tesfaw	South Gondar	
50	Zemene Shebabaw	South Gondar	
51	Adugna Brhanu	East Gojjam	Zonal supervior
52	Temesgen Demele	East Gojjam	
53	Fatuma Fanta	East Gojjam	
54	Addisu Almaw	East Gojjam	
55	Wondie Mareye	East Gojjam	
56	Asaye Birhanu	East Gojjam	
57	Enat Asefa	East Gojjam	
58	Alemneh Jalew	Awi	Zonal supervisor
59	Wuhib Bishaw	Awi	
60	Keheshen W/Gabriel	Awi	
61	Tafere Alamerew	Awi	
62	Abunu Asrese	Awi	
63	Ayechew Alemu	Awi	
64	Agedew Admasu	Awi	
65	Melissachew Adane	West Gojjam	Zonal supervisor
66	Demelash Fantahun	West Gojjam	
67	Anegu Achenef	West Gojjam	
68	Melekam Mengie	West Gojjam	
69	Andargie Atenaf	West Gojjam	
70	Menegesha Nega	West Gojjam	
71	Abebe Zelalem	West Gojjam	

OROMIA

Table B2: Oromia staff

	Name	Quadrant/Stratum*	Responsibility
1	Abate Tilahun	A	Supervisor
2	Tibebu Amante	A (Illubabor)	Team leader
3	Negassa Didda	A (Illubabor)	Interviewer
4	Adamu Biru	A (Illubabor)	Lab Technician
5	Nassir Abdo	A (Jimma)	Team leader
6	Shibelay Tadesse	A (Jimma)	Interviewer
7	Getachew Aga	A (Jimma)	Lab Technician
8	Melaku Tesgera	B	Supervisor
9	Mengesha Aseffa	B	Interviewer
10	Beyissa Bekele	B	Lab Technician
11	Tesfaye Teferi	C	Supervisor
12	Mesfin Tilahun	C	Interviewer
13	Mulugeta Zeinu	C	Lab Technician
14	Addis Mekasha	D	Supervisor
15	Hiwot Zewdu	D	Interviewer
16	Dinberu Gebremedhin	D	Lab Technician
17	Tolcha Regassa	D	Interviewer
18	Fekadu Asrat	D	Lab Technician

* See Table A2 for zones and special woredas included in each quadrant

SNNPR

Table B3: SNNPR staff

	Name	Quadrant/Stratum*	Responsibility
1	Nigussie Berhane	A	Supervisor
2	Bekele Gidane	A	Interviewer
3	Asnake Yohannes	A	Lab Technician
4	Getachew Temeche	B	Supervisor
5	Tesfaye Anjulo	B	Interviewer
6	Faris Feleke	B	Lab Technician
7	Mesfin Degu	C	Supervisor
8	Asrat Banzikes	C	Interviewer
9	Admassu Adero	C	Lab Technician
10	Gedeon Yohannes	D	Supervisor
11	Tiruwork Amare	D	Interviewer
12	Shewaye Yehualaeshet	D	Lab Technician
13	Getachew Erena	D	Team leader
14	Tarekegn Matto	D	Interviewer
15	Sharew Alemu	D	Lab Technician

* See Table A2 for zones and special woredas included in each quadrant

Sample design

Paul Emerson
Frank Richards
Estifanos Biru
Yeshewamebrat Ejigsemahu
Teshome Gebre
Aryc Mosher
Patricia Graves

Slide reading

Tekola Endeshaw
Berhan Ayele
Hussien Mohammed
Aschalew Fekede
Andualem Mekonnen

Data entry and cleaning

Eshetu Girmu
Dawit Getnet
Yeshewamebrat Ejigsemahu
Aryc Mosher

Data analysis

Jeremiah Ngondi
Patricia Graves
Paul Emerson

GPS, GIS and mapping

Aryc Mosher

Report writing

Patricia Graves
Jeremiah Ngondi

Appendix C: Questionnaire (English)

MALARIA INDICATOR SURVEY
MODEL HOUSEHOLD QUESTIONNAIRE

ETHIOPIA THE CARTER CENTER

SECTION I: IDENTIFICATION		
Unique Questionnaire Number:		☐☐☐☐
Cluster Number:		☐☐
Region (Amhara=1, Oromia =2, SNNPR=3)		☐
Zone (N. Gondar=01, Wahhirma=02, S. Gondar=03, N.Wello=04, W. Gojam=05, Awi=06, E. Gojam=07, S. Wello=08, Oromia=09, N. Shewa=10, Illubador=11, Jimma=12, Keffa=13, Sheka=14, Bench Maji=15)		☐☐
Woreda (*Write Name*)		_____
CDTI Wordea? (YES=1, NO=2)		☐
Kebele (*Write Name*)		_____
Has this Kebele Changed (YES=1, NO=2)		☐
If "Yes" How has it changed? Split with keeping Kebele Name=1 Split with loosing Kebele Name=2		☐
Please list all names of the new Kebeles in this area: 1. _____, 2. _____, 3. _____		
Place name (*Write Name*)		_____
NAME OF HOUSEHOLD HEAD (*Write Name*)		_____
HOUSEHOLD NUMBER (01-25) (*If Household Number is a multiple of 2, Blood Smear and RDT will be done for every Household Member*)		☐☐
GPS Coordinates	Elevation	☐☐☐☐☐ft
	Latitude	N ☐☐ ° ☐☐.☐☐☐
	Longitude	E ☐☐ ° ☐☐.☐☐☐

SECTION II: INTERVIEWER INFORMATION				
POSITION	**NAME**	**DATE dd/mmm/yy**		**INITIAL**
Interviewer/Team Leader		Interview Conducted	_ _/_ _ _/_ _	
Zonal Coordinator		Questionnaire Reviewed	_ _/_ _ _/_ _	
Data Clerk One		Data Entered #1	_ _/_ _ _/_ _	
Data Clerk Two		Data Entered #2	_ _/_ _ _/_ _	

SECTION III: HOUSEHOLD CHARACTERISTICS			
Ques. #	QUESTIONS AND FILTERS	CODING CATEGORIES	SKIP INFO
01	What is the main source of drinking water for members of your household?	01 Unprotected Spring 02 Capped Spring 03 Unprotected Dug Well (use bucket and rope) 04 Protected Dug Well (use hand pump) 05 Tube Well/Borehole 06 Surface Water (River/Dam/Lake/Pond/Stream) 07 Cart with Small Tank 08 Public Tap/Standpipe 09 Piped into Yard 10 Piped into Dwelling	☐☐
02	How long does a trip to collect water usually take?	1 <30 minutes 2 30-<40 minutes 3 40-90 minutes	☐

		4 >90 minutes	
03	What kind of toilet facilities does your household use?	1 No Facility/Bush/Field 2 Pit Latrine (no cement slab) 3 Pit Latrine with Slab 4 Pit Latrine with Cement Slab and Vent Pipe 5 Flush or pour toilet 6 Flush to septic tank 7 Flush to piped sewer system	☐
	Does your household have any of the following?		
04	Electricity	Electricity Yes=1, No=2	☐
05	Radio	Radio Yes=1, No=2	☐
06	Television	Television Yes=1, No=2	☐

SECTION IV: SLEEPING SPACES, INSECTICIDE SPRAYING, MOSQUITO NETS				
				SKIP INFO
	ROOM Number			☐☐
07	Does anyone sleep in this room?	Yes=1, No=2		☐ If No, skip to next room. If no other room, Skip to 21
08	Main material of the Room's Walls	1 Mud Blocks 2 Cement Blocks 3 Sticks 4 Wood Planks 5 Corrugated Metal 6 Other (*please specify*)_____		☐
09	Main material of the Room's Roof	1 Thatch 2 Sticks and mud 3 Corrugate 4 Other (*please specify*) _____		☐
10	Main material of the Room's Floor	1 Earth 2 Local dung plaster 3 Cement 4 Wood 5 Other (*please specify*)_____		☐
11	At any time in the past 12 months, have the interior walls of this room been sprayed against mosquitoes?	1 Yes 2 No 5 Don't Know		☐ If No, skip to 14
12	How many months ago was the room sprayed?	Less than one month=00 __ ___ Months Ago Don't Know=88		☐☐
13	Since your walls were sprayed can you show me if you covered the walls with anything such as new paint or plaster or paper?	Square Room 1 Up to 1 Wall 2 Up to 2 walls 3 Up to 3 walls 4 Every Wall 8 No Cover	Round Room 1 25% of Room 2 50% of Room 3 75% of Room 4 100% of Room 8 No Cover	☐
	SHOW ME WHERE PEOPLE SLEEP IN THIS ROOM			

14	Are there mosquito nets used in this room? *Ask to see the actual nets and where they hang*	1 Yes 2 No	☐ If No, skip to 20

NET INFORMATION FOR ROOM # _____ or Outside Sleepers____

	NET #	TYPE	CONDITION	WHEN ACQUIRED	Net Source	SKIP INFO
15	☐	1 Untreated Net 2 Locally Treated Net (ITN) 3 Long-Lasting Insecticide Treated Net (LLIN) 8 Don't Know ☐	1 Good (no holes) 2 Fair (no holes that fit a torch battery) 3 Poor (1-4 holes that fit a torch battery) 4 Unsafe (>5 Holes that fit a torch battery) 5 Unused (still in package) ☐	MONTHS AGO ☐☐ >3 years = 95 Don't know = 88	1 Government 2 Self-Purchased 3 Other (Specify) _____	Net # ☐ Type ☐ Cond ☐ When ☐☐ Source ☐

16	Has the net been treated with chemicals to kill mosquitoes?	1 Yes 2 No 8 Don't know	☐
17	When was this net treated?	MONTHS AGO <1 month = 00 >3 years = 95 Don't know = 88	☐☐
18	***WHO SLEPT UNDER THIS NET LAST NIGHT?***		

	NAME	SEX	RESIDENT	AGE	ELIGIBLE WOMEN	CURRENTLY PREGNANT?	
Person # Every person should have their own unique number	Please give me the names of the persons who slept under net, oldest first.	Is (NAME) male or female?	Does (NAME) usually live here?	How old is (NAME)?	CIRCLE NUMBER OF ALL WOMEN AGE 15-49	FOR ELIGIBLE WOMEN, ASK: Is (NAME) currently pregnant?	
☐☐		Male =1 Female =2	YES =1 NO = 2	In Years ☐☐	01 YES =1 NO = 2	YES =1 NO = 2 DON'T KNOW=8	Sex ☐ Res ☐ Age ☐☐ Elig ☐ Preg ☐
☐☐		Male =1 Female =2	YES =1 NO = 2	In Years ☐☐	02 YES =1 NO = 2	YES =1 NO = 2 DON'T KNOW=8	Sex ☐ Res ☐ Age ☐☐ Elig ☐ Preg ☐
☐☐		Male =1 Female =2	YES =1 NO = 2	In Years	03 YES =1 NO = 2	YES =1 NO = 2 DON'T KNOW=8	Sex ☐

				☐☐			Res ☐ Age ☐☐ Elig ☐ Preg ☐
	Additional People Information FOR ROOM # _____						SKIP INFO
19	Did anyone else sleep in this room under a net?			1 Yes 2 No			☐ If Yes, Complete Additional Net Information sheet
20	Did anyone else sleep in this room but not under a net?			1 Yes 2 No			☐ If No, skip 21
	NAME	SEX	RESIDENT	AGE	ELIGIBLE WOMEN	CURRENTLY PREGNANT?	
Person # Every person should have their own unique number	Give additional names of individuals who slept in this room but not under a net.	Is (NAME) male or female?	Does (NAME) usually live here?	How old is (NAME)?	CIRCLE NUMBER OF ALL WOMEN AGE 15-49	FOR ELIGIBLE WOMEN, ASK: Is (NAME) currently pregnant?	
☐☐		Male =1 Female =2	YES =1 NO = 2	In Years ☐☐	YES =1 NO = 2	YES =1 NO = 2 DON'T KNOW=8	Sex ☐ Res ☐ Age ☐☐ Elig ☐ Preg ☐
☐☐		Male =1 Female =2	YES =1 NO = 2	In Years ☐☐	YES =1 NO = 2	YES =1 NO = 2 DON'T KNOW=8	Sex ☐ Res ☐ Age ☐☐ Elig ☐ Preg ☐

☐☐		Male =1 Female =2	YES =1 NO = 2	In Years ☐☐	YES =1 NO = 2	YES =1 NO = 2 DON'T KNOW=8	Sex ☐ Res ☐ Age ☐☐ Elig ☐ Preg ☐
21	ARE THERE ANY OTHER NETS IN THIS HOUSEHOLD THAT I HAVE NOT SEEN?			YES=1 NO=2			☐ If No, Skip 23.
22	DID ANYONE SLEEP UNDER THIS NET?			YES=1 NO=2			☐ If Yes, Return Repeat #15-18
23	DID ANYONE SLEEP OUTSIDE?			YES=1 NO=2			☐ If No, Skip 25
24	DID HE/SHE SLEEP UNDER A NET?			YES=1 NO=2			If Yes, Return Repeat #15-18, CHECK OUTSIDE SLEEPERS
25	What is the Household Number? (Refer back to first page)						☐☐☐
26	Is Household Number a multiple of 2? (Ending with a "0", "2", "4", "6", or "8")			YES=1 NO=2			☐ if "No", End If "Yes" Skip 27
27	By the end of the Questionnaire Interview, HH completed consent?			Full Consent=1 Declined Partially=2 Declined Fully=3			☐
SECTION V: Rapid Diagnostic Test & Blood Slide Section							
27	*List all persons consenting and assenting to participate in the RDT/Blood Slide* *If no persons of the household gave consent to Blood Test, create a Person Number 99 and give the slide number 999/99/X*						

Person Number	**RDT Done** YES=1 NO=2	**RDT Results** PAN/Pf=1 PAN=2 Negative=3	Treatment? AZT=1 CQ=2 No Treatment=3	Blood Slide Taken? YES=1 NO=2 A	B	Slide Number Questionnaire Number/Person Number/A or B
☐☐	☐	☐	☐	☐	☐	☐☐☐☐/☐☐/☐ ☐☐☐☐/☐☐/☐
☐☐	☐	☐	☐	☐	☐	☐☐☐☐/☐☐/☐ ☐☐☐☐/☐☐/☐
☐☐	☐	☐	☐	☐	☐	☐☐☐☐/☐☐/☐

					☐☐☐☐/☐☐/☐
☐☐	☐	☐	☐	☐ ☐	☐☐☐☐/☐☐/☐ ☐☐☐☐/☐☐/☐
☐☐	☐	☐	☐	☐ ☐	☐☐☐☐/☐☐/☐ ☐☐☐☐/☐☐/☐
☐☐	☐	☐	☐	☐ ☐	☐☐☐☐/☐☐/☐ ☐☐☐☐/☐☐/☐

Additional People Information for Malaria Prevalence Survey HH# ____________

Person Number	**RDT Done** YES=1 NO=2	**RDT Results** PAN/Pf=1 PAN=2 Negative=3	Treatment? AZT=1 CQ=2 No Treatment=3	Blood Slide Taken? YES=1 NO=2 A B	Slide Number
☐☐	☐	☐	☐	☐ ☐	☐☐☐☐/☐☐/☐ ☐☐☐☐/☐☐/☐
☐☐	☐	☐	☐	☐ ☐	☐☐☐☐/☐☐/☐ ☐☐☐☐/☐☐/☐
☐☐	☐	☐	☐	☐ ☐	☐☐☐☐/☐☐/☐ ☐☐☐☐/☐☐/☐
☐☐	☐	☐	☐	☐ ☐	☐☐☐☐/☐☐/☐ ☐☐☐☐/☐☐/☐
☐☐	☐	☐	☐	☐ ☐	☐☐☐☐/☐☐/☐ ☐☐☐☐/☐☐/☐
☐☐	☐	☐	☐	☐ ☐	☐☐☐☐/☐☐/☐

					□□□□/□□/□
□□	□	□	□	□ □	□□□□/□□/□ □□□□/□□/□
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□□	□	□	□	□ □	□□□□/□□/□ □□□□/□□/□

SECTION VI: Individual screening form: Trachoma Control Program				
Serial number (Same as the HH questionnaire)	□□□	Name of Screener *(Write Name)*	_____	
Region	□	Date of survey	_ _/_ _ _/_ _	
Zone	□□	Data entry 1 (Initials)		
Woreda *(Write Name)*	_____	Data entry 2 (initials)		
Cluster *(Write Name)*	_____			
Kebele *(Write Name)*	_____			
Name of place	_____	Check here if no members of the HH gave consent to Trachoma Survey.		□

				Dis-Charge Yes=1 No -2	**Right Eye Yes=1 No -2**	**Left Eye Yes=1 No -2**	**TT surgery Yes=1 No -2**

ID	Name	Sex M=1 F=2	Age	Ocular	Nasal	TT	CO	TF	TI	TS	TT	CO	TF	TI	TS	RE	LE	TTC
01																		
02																		
03																		
04																		
05																		
06																		
07																		
08																		
09																		
10																		
11																		
12																		
13																		
14																		
15																		

Appendix D: Questionnaire (Amharic)

የወባ ጠቋሚ ጥናት

የቤተሰብ መረጃ መሰብሰቢያ

ክፍል አንድ፡ መጠይቅ መለያ	
የመጠይቁ መለያ ቁጥር	
የጥናት ጣቢያ ቁጥር	
ክልል= አማራ=1፤ ኦሮሚያ=2 ደቡብ ብሔር ብሔረሰቦችና ህዝቦች=3	
ዞን፡ ሰሜን ጎንደር=01፤ ዋግህምራ=02፤ ደቡብ ጎንደር=03፤ ሰሜን ወሎ=04፤ ምዕራብ ጎጃም=05፤ አዊ=06፤ ምስራቅ ጎጃም=07፤ ደቡብ ወሎ=08፤ ኦሮሚያ=09 ሰሜን ሸዋ=10፤ ኢሉባቦር=11፤ጂማ=12፤ከፋ=13፤ ሸካ=14፤ ቤንች ማጂ=15	
ወረዳ (ሥም ይጻፉ)፤	_____
ወረዳዉ ሲ.ዲ.ቲ.አይ (CDTI) ወረዳ ነውን? አዎ=1 አይደለም=2	
ቀበሌ (ሥም ይጻፉ)	_____
ቀበሌዉ ከቀድሞ አሁን ተለዉጧል? አዎ=1 አልተለወጠም=2	
ተለዉጦ ከሆነ እንዴት? ስሙን እንደያዘ በተለያዩ ቀበሌያት ተከፋፍሏል=1 በመከፋፈሉ ምክንያት ስሙ ተለዉጧል=2	
በአካባቢዉ የተፈጠሩትን አዳዲስ ቀበሌያት ስም ይግለጹልን፡ 1. _____ 2. _____ 3._____	
የቦታው ሥም (ስም ይጻፉ)	_____
የቤተሰብ ኃላፊ ሥም (ስም ይጻፉ)	_____
የቤተሰብ ተራ ቁጥር፡ (የቤተሰቡ ተራ ቁጥር የሁለት ብዜት ከሆነ ከሁሉም የቤተሰብ አባላት የደም ናሙና በስላይድ ላይ ይወሰዳል፤ ፈጣን የወባ ምርመራም ይደረጋል)	
GPS — Elevation	ft
GPS — Latitude	N __ __ __ °__ __ __
GPS — Longitude	E __ __ __ °__ __ __

ክፍል ሁለት፡ የጠያቂው መረጃ			
ኃላፊነት	ሥም	ቀን፤ ቀን/ወር/ዓመት	ፊርማ
ቃለመጠይቅ አድራጊ		ቃለመጠይቅ የተደረገበት ቀን --/---/----	
ተቆጣጣሪ		መጠይቁ እንደገና የታየበት/የተፈተሸበት ቀን --/---/---	
አንደኛ መረጃ አስገቢ		መረጃው ኮምፒውተር ውስጥ የገባበት ቀን ---/---/----	
ሁለተኛ መረጃ አስገቢ		መረጃው ኮምፒውተር ውስጥ የገባበት ቀን ---/---/----	

ክፍል ሶስት፡ የቤተሰብ ሁኔታ			
ተ.ቁ	ጥያቄዎች	የመልስ ምርጫዎች	አለፍ/ፊ
01	ለቤተሰብዎ የመጠጥ ውሃ በዋናነት የሚያገኙት ከየት ነው?	1=ያልተጠበቀ ምንጭ 2=የተጠበቀ ምንጭ 3=ያልተጠበቀ የጉድንድ ውሃ 4=የተጠበቀ የጉድንድ ውሃ 5=ጥልቅ ጉድንድ 6=የገፅ-ምድረ ውሃ (ወንዝ፤ ኩሬ፤ ወዘተ) 7=በጋሪ የሚመጣ የጀሪካ/በርሜል ውሃ 8=የወል ቧንቧ/የቦኖ ውሃ 9=ከግቢ ቧንቧ 10=የቤት ውስጥ ቧንቧ	

02	የመጠጥ ውሃውን የሚቀዱበት ቦታ ደርሶ መልስ ስንት ደቂቃ ይወስዳል?	1=ከ40 ደቂቃ ያነሰ ጊዜ 2=ከ40-90 ደቂቃ 3=ከ90 ደቂቃ በላይ	
03	ቤተሰብዎ የሚጠቀምበት የመፀዳጃ ቤት ምን ዓይነት ነው?	1=መፀዳጃ ቤት የለም/ጫካ/ሜዳ ላይ ነው 2=መፀዳጃ ጉድጓድ ስሚንቶ የሌለው ወለል 3=መፀዳጃ ጉድጓድ ባለስሚንቶ ወለል 4=መፀዳጃ ጉድጓድ ባለስሚንቶ ወለልና ሽታ ማስወገጃ ቱቦ ያለው 5=መፀዳጃ ጉድጓድ በውሃ የሚሰራ መቀመጫ ያለው 6=በውሃ የሚሰራ መፀዳጃ (ከሰፕቲክ ታንክ ጋር) 7=በውሃ የሚሰራ መፀዳጃ (ወደ መዘጋጃ የሚገባ)	
04 ኤሌትሪክ 05 ራድዮ 06 ቴሌቪዥን	በቤትዎ ውስጥ ከዚህ በታች የተዘረዘሩት ቁሳቁሶች አሉን?	ኤሌትሪክ፤ 1=አለ 2=የለም ራድዮ ፤ 1=አለ 2=የለም ቴሌቪዥን፤ 1=አለ 2=የለም	

ክፍል አራት፡ የመኝታ ክፍሎች፤ የመድሀኒት ስርጭት እና የአልጋ አጎበርን በተመለከተ			
			እለፍ/ፊ
	የማደሪያ ክፍል ቁጥር፡		☐☐
	ጥያቄዎች	የመልስ ምርጫዎች	
07	በዚህ የማደሪያ ክፍል ውስጥ የሚያድር ሰው አለን?	1. አዎ 2. የለም	መልሱ «የለም» ከሆነ ወደ ሌላ የማደሪያ ክፍል እለፍ/ፊ። ሌላ የማደሪያ ክፍል ከሌለ ወደ ጥያቄ 21 እለፍ/ፊ ☐ ☐
08	የዚህ ማደሪያ ክፍል ግድግዳ የተሰራው ከምንድነው?	1=ከጭቃ ጡብ 2=ከብሎኬት 3=ከእንጨት 4=ከጣውላ 5=ከቆርቆሮ 6=ሌላ (ይገለፅ) ----------	☐ ☐
09	የዚህ ማደሪያ ክፍል ጣርያ የተሰራው ከምንድነው፡	1. ሣር ክዳን 2. እንጨትና ጭቃ 3. ቆርቆሮ 4. ሌላ (ይገለፅ) ----------	☐
10	የዚህ ማደሪያ ክፍል ወለል የተሰራው በምንድነው?	1. አፈር 2. በእበት የተለቀለቀ 3. ከስሚንቶ 4. ከጣውላ 5. ሌላ (ይገለፅ) ---------	☐
11	ባለፉት 12 ወራት ውስጥ የዚህ ማደሪያ ክፍል የውስጥ ግድግዳዎች በፀረ-ትንኝ መድሀኒት ተረጭተው ነበር?	1. አዎ 2. አልተረጨም 3. አላውቅም	መልሱ «አልተረጨም» ከሆነ ወደ ጥያቄ 14 እለፍ/ፊ ☐ ☐
12	ከተረጨ ስንት ወር ይሆነዋል?	----------ወራት 00= ከአንድ ወር ያነሰ ጊዜ 88=አላውቅም	☐☐ ☐☐
13	ክፍሉ ከተረጨ በኋላ ግድግዳዎች ቀለም ተቀብተው ወይንም ተለስነው ከሆነ ያንን ቦታ ያሳዩኛል?	አራት ማዕዘን ክፍል 1=አንድ ጎን የሚያህል ግድግዳ 2=ሁለት ጎን የሚያህል ግድግዳ 3=ሦስት ጎን የሚያህል ግድግዳ 4=ሁሉም የጎን ግድግዳዎች ክብ ክፍል 1=የክፍሉን 25% 2=የክፍሉን 50% 3=የክፍሉን 75% 4=ሙሉዉ ክፍል (100%)	አራት ማዕዘን ክፍል ☐ ክብ ክፍል ☐ ☐
	እዚህ ክፍል ውስጥ ሰዎች የት ቦታ እንደሚተኙ ቢያሳዩኝ		
14	በዚህ ክፍል ውስጥ የትንኝ መከላከያ አጎበር/ሮች አላችሁን?	1. አዎ 2. የለም	መልሱ «የለም» ከሆነ ወደ ሚቀጥለው ክፍል እለፍ/ፊ። ክፍሉ ይህ ብቻ ከሆነ ወደ ጥያቄ 21 ሂድ/ጂ ☐

ስለማደሪያ ክፍል ቁጥር------ የትንኝ መከላከያ አጎበር ወይም ደጅ ስላደሩ ሰዎች መረጃ

15	**የትንኝ መከላከያ አጎበር ቁጥር --**	**የትንኝ መከላከያ አጎበር አይነት** **1. ያልተነከረ** **2. አገር ውስጥ የማነከር** **3. ፋብሪካ ውስጥ የተነከረ** **8. አላውቀውም**	**የትንኝ መከላከያ አጎበር ሁኔታ** **1. ጥሩ ነው ቀዳዳ የለዉም** **2. ደህና ነው (ቀዳዳው ትንሽን የባትሪ ድንጋይ አያሳልፍም)** **3. ጥሩ አይደለም (ከ1-4 ያሉት ቀዳዳዎች ትንሽ የባትሪ ድንጋይ ያሳልፋሉ)** **4. አስተማማኝ አይደለም (ከ5 የሚበልጡት ቀዳዳዎች ትንሽ የባትሪ ድንጋይ ያሳልፋሉ)** **5. አልተጠቀመበትም (እነደታሸገ ነው)**	**የትንኝ መከላከያ አጎበሩን መቼ እንዳገኙት** **ከ---ወራት በፊት** **ከሶስት ዓመት በፊት=95** **አላውቅም=88**	**እለፍ/ፊ** **አጎበር ቁ** **ዓይነት** **ሁኔታ** **መቼ**
16	**ይህ የትንኝ መከላከያ አጎበር በፀረ-ትንኝ ኬሚካል ተነክሮ ነበር?**			**1. አዎ** **2. አልተነከረም** **8. አላውቅም**	
17	**የተነከረ ከሆነ መቼ ነው?**			**ከወራት በፊት** **95= ከሶስት ዓመት በፊት** **88=አላውቅም**	
18	**ትናንት ማታ በዚህ የትንኝ መከላከያ አጎበር ውስጥ የተኛው ሰው ማን ነበር?**				

የተኛው ሰው መለያ ቁጥር	**የተኛው ሰው ሥም**	**ፆታ** **1. ወንድ** **2. ሴት**	**በቤት ውስጥ ነዋሪ ናቸው?** **1. አዎ** **2. አይደሉም**	**ዕድሜ** **(በዓመት)**	**ከ15-49 ዕድሜ ያሉ ሴት ናቸውን? (ብቁነት)** **1. አዎ** **2. አይደሉም (በዚህ ዕድሜ ክልል ያሉ ሴቶች ቁጥር ይክበቡ)**	**እኚህ ሴት በአሁኑ ጊዜ ነፍሰጡር ናቸውን? (ከ15-49 ላሉ ሁሉ ይጠይቁ)** **1. አዎ** **2. አይደሉም** **3. አላውቅም**	
□□				□□	**01**		**ፆታ** **ኗሪነት** **ዕድሜ** **ብቁነት** **ነ/ጡር**
□□				□□	**02**		**ፆታ** **ኗሪነት** **ዕድሜ** **ብቁነት** **ነ/ጡር**
□□				□□	**03**		**ፆታ** **ኗሪነት** **ዕድሜ**

							ብቁነት ነ/ጡር	

	የተጨማሪ ሰዎች መረጃ ለማደሪያ ክፍል ቁጥር ---------						እልፍ/ፊ
19	ሌላ ሰው በዚህ የትንኝ መከላከያ አጎበር ውስጥ ባለፈው ማታ አድሮ ነበርን?			1. አዎ 2. አላደረም			መልሱ « አዎ» ከሆነ ሌላ የአጎበር ቅፅ ይሞላ
20	የትንኝ መከላከያ አጎበር ውስጥ ባይሆንም በዚህ የማደሪያ ክፍል ውስጥ ባለፈው ለሊት ያደረ ሰው አለን?			1. አዎ 2. አላደረም			መልሱ አላደረም ከሆነ ወደ ጥያቄ 21 ሂድ/ጂ
የተኛው ሰው መለያ ቁጥር	በዚህ ክፍል ውስጥአድሮ ግን የትንኝ መከላከያ አጎበር ውስጥ ያልተኛ ሰው ሥም	ፆታ	በቤት ውስጥ ነዋሪ ናቸውን?	ዕድሜ በዓመት	ከ15-49 ዕድሜ ያሉ ሴት ናቸውን?	አኚህ ሴት በአሁኑ ጊዜ ነፍሰጡር ናቸውን?	እለፍ/ፊ
☐☐		ወንድ= 1 ሴት =2	አዎ=1 አይደሉም=2	በዓመት ☐☐	01 አዎ=1 አይደሉም=2	አዎ =1 አይደሉም=2 አላውቅም=8	ፆታ ☐ ነዋሪ ☐ ዕድሜ ☐☐ 15-49 ☐ ነፍሰጡር ☐ አጎበር ☐
☐☐		ወንድ= 1 ሴት =2	አዎ=1 አይደሉም=2	በዓመት ☐☐	02 አዎ=1 አይደሉም=2		ፆታ ☐ ነዋሪ ☐ ዕድሜ ☐☐ 15-49 ☐ ነፍሰጡር ☐ አጎበር ☐

☐☐		ወንድ= 1 ሴት =2	አዎ=1 አይደሉም=2	በዓመት ☐☐	03 አዎ=1 አይደሉም=2		ያታ ☐ ነዋሪ ☐ ዕድሜ ☐☐ 15-49 ☐ ነፍሰጡር ☐ አጎበር ☐

21	እዚህ ቤት ውስጥ ሌላ እኔ ያላየሁት የትንኝ መከላከያ አጎበር አለን?	አለ=1 የለም=2	☐ መልሱ «የለም» ከሆነ ወደ ጥያቄ 23 ሂድ/ጂ
22	በዚህ የትንኝ መከላከያ አጎበር ውስጥ ትናንት ማታ ሰው አድሮ ነበርን?	አዎ=1 አላደረም=2	☐ መልሱ «አዎ» ከሆነ የአጎበር መረጃ ቅፅ ይሞላ
23	ትናንት ማታ ከቤት ውጭ/ደጅ ያደረ ሰው ነበርን?	አዎ=1 የለም=2	☐ መልሱ «አላደረም» ከሆነ ወደ ጥያቄ 25 ሂድ/ጂ
24	ውጭ/ደጅ ያደረ ሰው ካለ እሱ ወይንም እሷ በትንኝ መከላከያ አጎበር ውስጥ ነበር ያደሩት?	አዎ=1 አይደለም=2	☐ መልሱ «አዎ» ከሆነ የአጎበር መረጃ ቅፅ ይሞላ እንዲሁም ውጭው/ደጅ መኝታ ይታይ
25	የዚህ ቤተሰብ ተራ ቁጥር ስንት ነው? ---------(ወደ ገፅ 1 በመሄድ ይመልከቱ)		☐☐☐
26	የዚህ ቤተሰብ ተራ ቁጥር የ 2 ብዜት ነውን? (ወይንም የቤተሰብ ተራ ቁጥሩ መጨረሻ 0፤2፤4፤6፤8፤ ነውን?	አዎ=1 አይደለም=2	መልሱ «አይደለም» ከሆነ ይህ መጨረሻ ነው:: መልሱ «አዎ» ከሆነ ወደ ጥያቄ 27 እለፍ/ፊ