

2015

# The Sixth Malaria Research Network Symposium Proceeding



Addis Continental Institute of Public Health

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## Acknowledgment

Malaria research network symposium was conducted by collaborative and unreserved efforts of different organizations and individuals. The Ethiopian Malaria Research Network would like to acknowledge those organizations and individuals who worked hard in organizing this symposium. We would like to acknowledge Arba Minch University (AMU) for hosting this symposium with great tenderness and hospitality. We are thankful for Addis Continental Institute of Public Health/strengthening malaria monitoring and evaluation systems (SMMES) project for the very organized coordination of this symposium. This symposium would have not been realized without the active engagement of researchers who made their presentation; we were privileged to have you all. We would also like to thank all participants, especially graduate students who attended the symposium.

Last but not least we would like to express our heartfelt gratitude for USAID/PMI for financially supporting this symposium. None would have happened without your generous support.

## Summary

Addis Continental Institute of Public Health (ACIPH)/SMMES project in collaboration with PMI organized a two day research network symposium held at Arba Minch University, August 25-26, 2015. The overall objective of the research network was to improve connections between researchers, universities, policy makers, and organizations that implement malaria control activities.

More than 150 participants from FMOH, agencies, regional health bureaus, Universities, non-governmental organizations (NGO) and other agencies participated in the symposium. More than 15 research papers were presented in the symposium.

A welcome speech was made by Mr. Behailu on behalf of the college of medicine and health Science of Arba Minch University. Following, a keynote was given by Dr. Gunawardena Dissanayake which started with a brief introduction about the PMI's activities, both in Ethiopia and the other countries in Africa. He also stated the development of a new project last year: Strengthening Malaria Monitoring and Evaluation systems (SMMES) Project which is now lead by the Addis Continental Institute of Public Health. The importance of having more interaction with other Universities, specifically through trainings such as postdoctoral opportunities, workshops and research conferences these would be of a great contribution to researches as it will strengthen malaria research network which is in its infancy.

Second key note was given by Dr. Adugna from EPHI, he mentioned about the third Malaria Indicator Survey which the institute is preparing to undertake. Dr. Adugna also mentioned that information generated from different sources is not well utilized after data generation and he encourages universities to take part and do further analysis, especially for postgraduate study. He also recommends the network to serve as knowledge management center to the extent of establishing its own journal.

The opening speech was made by Dr. Damtew on Behalf of the University President, Following a presentation on the overview of SMMES project regarding malaria research network by Dr. Ayele, .this was followed by presentation on operational research by prof Yemane, he addressed key

issues regarding operational research in Malaria which focused on why research is needed; different type and definitions of research; operational research premises and thinking; and the building principles.

On the second session four presentations were made on national malaria strategy and malaria related information gap, and Malaria situation in SNNP region, presented by Fikadu Massebo, which he mentioned that the malaria related mortality was reduced due to the scale up of interventions. Third and fourth presentations were made regarding Malaria vector control in south Ethiopia and Review of Malaria Epidemics in Ethiopia using Enhanced Climate Services, this presentation emphasized the link between climate and malaria transmission. It also mentioned information limitation on climate variability at the district level which will affect public health decision-making. In this presentation findings of the review of the malaria epidemics and their characteristics based on the enhanced climate service data was presented. Finally, participants provided their input during discussions following the presentations.

In the afternoon there were two sessions and group discussion at the end of each session was made. The first session covered three research papers presented on genetic diversity of *Plasmodium falciparum* isolates in South Ethiopia and in the second session four papers were presented and they focus on malaria prevalence and associated factors such as asymptomatic malaria in pregnancy; Malaria and its association with ABO/Rh Blood Groups and a seven years trend of Malaria cases. On day two nine presentations were made in three sessions each categorized under Malaria Treatment (Clinical Pharmacology), Malaria diagnosis: microscopy and Malaria prevention. The final session of the symposium, focused on the network's future direction and at last the symposium was concluded by putting the following points as way forward.

- strengthen M&E at FMOH to strongly follow research undertakings in the country
- to have the office at AAU, but again this is open for all Universities and other institutes.
- to give the network responsibility of Coordinating researchers and institutions.
- For EPHI to coordinated Operational research and to take an active role in the network
- To prepare brief policy for the research network
- to do stakeholder analysis to include universities and regions that are not represented

- to share information like MIS and be transparent. This to be the responsibility of this network and need to solve such problem.
- For the steering committees to develop a strategic plan and the organogram. Also to assign people who will be responsible for this and at the end to have a full document with the strategic plan.
- To add AMU to the coordinating body and consider two institutions, namely the Aklilu Lemma and Harman Hansen research institutes.

## Acronyms

AAU	Addis Ababa University
ACIPH	Addis Continental Institute Of Public Health
AMU	Arba Minch University
ACT	Artemisinin-Based Combination Therapies
ELISA	Enzyme Linked Immunosorbent Assay
ENACTS	Enhancing National Climate Services
ENSO	El Niño–Southern Oscillation
EPHI	Ethiopian Public Health Institute
FMOH	Federal Ministry of Health
ICAP	International Center For Aids Care And Treatment Program
IRI	International Research Institute For Climate And Society
IRS	Indoor RESIDUAL SPRAYING
ITN	Insecticide Treated Nets
LLIN	Long Lasting Insecticide Treated Nets
M&E	Monitoring And Evaluation
MIS	Malaria Indicator Survey
MOI	Multiplicity Of Infection
NMA	National Metrology Agency
PATH-MACEPA	Program for Appropriate Technology in Health-Malaria Control and Elimination Partnership in Africa
PCR	Polymerase Chain Reaction
PMI	President’s Malaria Initiative
SMMES	Strengthening Malaria Monitoring and Evaluation Systems
USAID	United States Agency for International Development
TOR	Term Of Reference

## Welcome and Introductory Remark

A welcome speech was made by Mr. Behailu on behalf of the college of medicine and health Science. In his speech, he emphasized the scientific advancements made in medicine and public health since the introduction of the first antibiotic. A significant issue highlighted was the eradication of small pox. He also mentioned that many interventions were developed in the last century in the fight against malaria, although malaria still remains a global concern in today's world. In Ethiopia, malaria continues to be public health challenge, although the FMOH and its partners have been successful in reducing morbidity and mortality due to malaria in the country. He mentioned some of the interventions executed by the FMOH and also acknowledged the contribution of the scientific community in both public and private institutions in the generation of scientific evidence. He finally introduced the purpose of this symposium: "to bring all the efforts made to study all aspects of malaria and contribute to the scientific knowledge thereby bring evidence to the policy makers and make life free from malaria". He finally wished the audience a fruitful symposium.

Following Mr. Behailu's speech, Dr. Gunawardena Dissanayake took the stage and gave the key note address. In his speech he acknowledged the presence of both senior and junior researchers at the symposium. He provided a brief introduction about the PMI's activities, both in Ethiopia and the other 23 countries in Africa, **MECON** region and Amazon. He mentioned that PMI mainly focus on malaria service delivery and supports LLIN distribution, IRS spray, case management of malaria, and the development and maintenance of surveillance systems. He also acknowledged the limited effort made to fund and support malaria research undertaken by the initiative previously. However in recent years, progress in research has been made by collaborating with public universities; to mention a few, Addis Ababa, Jimma and Mekele Universities were some of the collaborators in research. He also noted that similar collaborations with Arba Minch University are encouraged.

He also stated that the development of a new project last year: Strengthening Malaria Monitoring and Evaluation systems (SMMES) Project. It is now lead by the Addis Continental Institute of Public Health and acknowledged the contribution of the ACIPH team for the progress of the project. He also mentioned that through the SMMES project there are now research initiatives, such as the LLIN longevity study. There are also other research plans to work with EPHI and MOH.



He emphasized the research potential in Ethiopia, especially on malaria. To mention some, different *Plasmodium* species exist in Ethiopia; a huge reduction in the number of confirmed malaria cases was observed in three years since 2012; and every month new research publications come out in peer reviewed reputable journals. Many countries take lesson from Ethiopia and now the national malaria control program is gearing up talks about pre-elimination, which is a head of many countries. Furthermore, he mentioned some key priority research areas, specifically on case management:

- What is the role of primaquine in case management?
- What are the causes of insecticidal resistance and how do we handle such resistance?
- How do we combine different interventions to enhance their effect?

Modeling is also important, as it brings people from different disciplines together to expand the scope of malaria research.

He also noted that the malaria research network is in its infancy as it is only the 6<sup>th</sup> symposium to be conducted. It is imperative for the network members to think about how to make this forum very innovative and what things to do differently to attract more researchers. Besides, doing research in an organized manner, it is also important and to organize these research outputs together in a database so that people could visit and use them.

It is also important to have more interaction with other Universities, specifically through trainings such as postdoctoral opportunities, workshops and research conferences. Putting such information together and helping researchers access it could also be a great contribution. The collaboration between different researchers is also one of the areas emphasized by the speaker. He stated that more authors in a publication means the research is very rich, as it will be reviewed by the many experts. So we have to encourage such activities.

He stated that PMI encourages inter-university collaborations and now their program has sufficient funding and expertise. However, more research initiatives should come from MOH and EPHI. Finally, for the junior researchers, he said the world is full of opportunities and make sure you choose the right topic and collaborate with researchers, learn from them and move forward.

The next key note address was made by Dr. Adugna Woyessa, representing the EPHI. Dr. Adugna stated that EPHI is one of the oldest institutes, established in early 50s in Ethiopia. The institute strives to excel in generating public health research, laboratory researchers, and managing both existing and newly emerging health problems. He mentioned that he leads the communicable disease unit where Malaria is one of them. According to his speech the institute has been collaborating with various institutions to create a better platform both for seniors and juniors to

share their research output. In collaboration with the FMOH the institute has established surveillance sites that can serve as parasitological and entomological research sites.

Currently the institute is preparing to undertake the third Malaria Indicator Survey; 13 institutions are working with EPHI in different task forces. Now the institute is planning to include regional health offices in the process and engage them in the MIS 2015; the institute wishes for the regional health bureaus to take this role in the future and manage it in collaboration with Universities.

Dr. Adugna also mentioned that the information is not well utilized after data generation and he encourages universities to take part and do further analysis, especially for postgraduate study. He said in the coming academic year we would like to see students ask us for these data.

He also emphasized vector control activities and he mentioned that Arba Minch and the nearby area where vector control activities are actually done. So whenever vector control activities are mentioned their names are mentioned together. According to his speech, the institute is working with Arba Minch University for vector control research and currently we are currently working with Arba Minch University; so more researchers and senior researchers will come-out from Arba Minch University in the future.

He mentioned about the treatment issue and he said that malaria is declining and this poses a challenge for the community. It is difficult to convince people to continue using interventions when malaria is declining. The other issue is that less attention is given for *P. vivax* malaria and now it is on the rise. Evidence shows that *P. vivax* could cause severe forms of malaria. Now EPHI is working with ICAP on clinical research of drug management of *P. vivax*. Once the evidence is ready, hospitals and other health facilities are expected to follow malaria patients with *P. vivax* to see the treatment effect.

Finally he encourages graduates and junior researchers to work on malaria as it is one of the oldest and still important public health issues in Ethiopia. He also recommends the network to serve as knowledge management center to the extent of establishing its own journal. He also suggested that EPHI has huge server currently which could serve as portal.

The opening speech was made by Dr. Damtew on Behalf of the University President; in his speech Dr. Damtew acknowledged the effort made by the symposium organizers and the different partners who made this day a reality. He mentioned that this is recognition of government effort in the fight against malaria and on behalf of Arba Minch University; he is pleased to host this symposium. He stated that malaria is one of the public health hazards the developing nations, especially in African countries, faced. Malaria poses a great challenge on economies of emerging nations which are struggling to promote sustainable social and human development. In this regard we have to rely on research for development of new tools and evidence for prevention

and treatment of malaria. We also need appropriate mechanism to translate research results as quickly as possible to its effective application to tackle the deadly disease while waiting for an effective vaccination. In this effort, focusing on those most vulnerable groups such as children and pregnant women has to be the way to address this challenge.

He also introduced the sessions to be covered in this two days symposium including the discussion to be made on the research network itself. He mentioned that recent progress regarding treatment, biology of malaria parasites, better understanding of the human host and the best approach to carry-out the designed intervention for better output.

He stated that considering the seriousness of the malaria problem in Ethiopia the government has placed the issue on the top of its agenda and designed a five year strategy. The entire world is engaged in the battle against malaria; the battle has to be a holistic approach to target interventions; it's equally important to promote new research to generate evidence; it is also important for public health policies to give priority for research to generate evidence for decision making. The Government of Ethiopia is also promoting research and at the University level there is a vice-president in charge of promotion of research undertaking; there has been research on malaria done by the university and some of them will be presented here at the symposium.

He mentioned that the effort made by the researchers in this symposium should save millions of life. The effort has to continue and it has to be towards problem solving. It is also important to take this opportunity as a means of capacity building and forge long term partnership both in Ethiopia and internationally for malaria.

He finally wished a fruitful stay in Arba Minch and officially opens the symposium.

## Session I: Setting the Scene

### Strengthening Malaria Monitoring and Evaluation Projects Background: malaria research Network

Dr. Ayele Zewde,

Dr. Ayele started his presentation by introducing Addis Continental Institute of Public Health (ACIPH) which is one of the private public health institutes in Ethiopia. The institute works to Close knowledge gaps through south-north (S2N) and south-south (S2S) collaborations; promote public-private partnerships in public health; Strengthen monitoring and evaluation practices to improve availability of evidence for decision making; Conduct training and research for a better public health practices; and create opportunities for affordable public health graduate education for Africans. He added that ACIPH is a training and research institute which partners with more than six public universities and a number of universities in Europe, Africa and America. The institute is currently implanting a project named strengthening malaria monitoring and evaluation funded by the USAID/PMI. This is a five year project which strives to support the malaria control M&E and operational research.

He also stated that the project has four focus areas one of them is strengthening the malaria research network. This network was established to facilitate coordination and collaboration among researchers and institutes; create platform for the dissemination of results and facilitate use of malaria research findings for strengthening program. He finally invites the participants to read the short TOR of the network distributed and announce there will be a short discussion on the TOR at the end of the symposium on the way forward.

### Operational research on Malaria

*Prof. Yemane Berhane*

This presentation addressed four key issues regarding operational research in Malaria and research in general. It focused on why research is needed; different type and definitions of research; operational research premises and thinking; and the building principles.

Prof. Yemane began by quoting Wernher Von Braun, who was one of the most important rocket developers; saying “ research is what I am doing when I don’t know what I am doing” he emphasized that research is conducted to solve problems and expand the horizon of our knowledge.

As pointed out in the presentation, research has to be a team effort and both beginning researchers and seniors play significant role in coining the research agenda and producing

output. The beginners could see possibilities while the seniors guide the best way of realizing that possibility.

In general research could be classified in to applied, basic and operational research. The first is usually driven by desire to answer specific questions; the second comes out of the mere curiosity and desire to expand knowledge; and the last envisioned to generate evidence for decision making. The aim for operational research in Malaria is not far from here and focuses on generating evidence to help overcome bottlenecks, contributes to the scale-up of malaria control activities and identifies the most cost-effective mix of currently recommended interventions in different malaria transmission settings.

When we do operational research we have to be cognizant of the resource limitation, thus there is a need to refocus and prioritize the operational research agenda on malaria. For instance, the PMI has identified 53 operational research priority activities for malaria. These priority areas are: Diagnosis and Treatment; Prevention and vector control; Surveillance; Epidemiology and transmission; health systems and cost-effectiveness ...

The PMI supported four proven and effective malaria prevention and treatment measures; in order to improve the scale-up of these interventions PMI has also identified key operational research questions which need to be answered:

- how to implement combinations of these interventions in sequence or in parallel,
- how the interventions should be tailored to different epidemiological settings,
- how to implement interventions in the most cost-effective manner,
- how to preserve the effectiveness of proven interventions that are threatened by resistance or other risks, and
- how best to incorporate promising new interventions and innovations

Prof. Yemane has also explained that the research process is composed of specific components, to target the objectives. It always focused on how to achieve objectives. It is a systematic process and has to be clear in our mind. Good research is a creative thinking process; poorly designed and planned research cannot be salvaged by sophisticated technology and software.

## **Session II: Current Malaria Affair**

In this session, there were four presentations focusing on the current malaria strategy; the malaria epidemiology in Gamo Gofa Zone; malaria vector control in South Ethiopia specifically in Arba Minch and Review of Malaria Epidemics in Ethiopia using Enhanced Climate Services (ENACTS) Nationalities. The session was moderated by Dr. Wakgari Derressa from Addis Ababa University School of Public Health.

### **The national malaria strategy and malaria related information gap**

By Mrs. Hiwot Solomon

Ms. Hiwot's presentation mainly focused on the national malaria strategy and how it evolved in to being. She has also addressed the changing trend of malaria burden. She mentioned that the outpatient visit, admission and death due to malaria have been reduced substantially in the country. Similarly the slide positivity rate reduced from 23% to 15%. The same with the number of epidemics reported over the years. For instance, in 2003 the number of epidemics reported was as high as 3,689 and this number reduced as low as 3 in the year 2007/2008.

Recently the ministry has established epidemiological classification of Woredas based on the annual parasite incidence; this stratification guides the choice of appropriate interventions.

She acknowledged that malaria program functions in line with the national health policy and it is one the major priority programs that has been enjoying utmost government commitment and attention over the years. However the program is not without challenges. The following were the challenges faced by the program: underutilization of interventions such as long lasting insecticidal net; problems with target setting for IRS operation; insecticidal resistance; accumulation of obsolete insecticides; poor quality of malaria laboratory diagnosis; inadequate monitoring and evaluation; and a gap in supply chain management.

The country is now progressing to be in the pre-elimination phase, which is a great achievement for the national malaria program. To strengthen further, the national malaria program is working towards the three goals set by the national malaria strategy and its 6 strategic objectives. To realize the strategic goals and the objectives, this national program is estimated to cost around 973,884,080 USD over five years.

### **Five years trends of malaria in Gamo Gofa Zone**

By Abraham Waka

Mr. Abraham stated that Gamo Gofa zone has 15 malarious woredas, of which 10 are considered hot spots, and LLIN is the main stay of intervention and all woredas received LLIN. In addition, the hot spot woredas are given IRS. Currently they are using Bendocarb and Propoxil for IRS.

The zone has 54 health centers, 2 hospitals and 284 health posts. Looking at the malaria epidemiology, *plasmodium falciparum* is the dominant species in the zone and Kucha has shown the highest number of malaria cases due to *P.falciparum*.

He mentioned that the malaria program had the following challenges:

- Lack of community participation on environmental control activities.
- Road construction (breeding sites)
- Insecticide resistance
- Drug resistance
- Delivering of expired and/or near expired larvicidal chemicals
- Retire of Entomology technician/lack of entomologist.
- Shortage of Budget for vector control activates.
- Shortage on IRS operational cost.

Finally, he suggested the following priority areas for research:

- Research targeting the challenges
- Monitoring susceptibility status of malaria vector.
- Evaluating efficacy of IRS Insecticides

### **Malaria Vector Control in South Ethiopia: challenges and opportunities**

#### **Fekadu Massebo**

Mr. Fekadu in his presentation addressed the current global and national malaria situation; the historical perspective of malaria in Arba Minch area; current research findings from Arba Minch and challenges and opportunities in Arba Minch. He mentioned that the malaria related mortality was reduced by more than in Africa due to the scale up of interventions. Ethiopia also enjoys substantial reduction in number of malaria cases since 2005; this reduction is also attributed to the increasing coverage of LLIN and IRS.

He also mentioned that in the early 1960's, because of the fear of malaria the large areas of fertile land in Arba Minch were not utilized; in 1960 a large number of populations moved to the fertile area and settled. In the 1980s with the urbanization, new establishment and institutions came in to being. At that time, Arba Minch Water Technology Institute, Arba Minch Teachers Training Institute, Textile factory and two state farms were established. When the irrigation farms created mosquito breeding site, the new establishment invited more susceptible people to the area. These had fueled the transmission of malaria in the area. Despite the malaria problem in the area little was done at the point. After a while, a health centre was built inside state farm for malaria treatment; latter, independent malaria control department was established in the zone.

Mr. Fekadu also mentioned that there were research outputs that came out of this area since 1997. These studies have contributed to advancement of the understanding of malaria parasite and the interventions in the area. The studies were focusing on entomological studies to understand mosquito behaviour, insecticide resistance studies, and epidemiological studies to understand distribution of malaria infection in the population.

## **Review of Malaria Epidemics in Ethiopia using Enhanced Climate Services (ENACTS)**

### **Dr. Adugna Woyessa**

The main emphasis of this presentation was the link between climate and malaria transmission. Dr. Adugna states that malaria is a disease directly linked to temperature and rainfall as evidenced by numerous literature in Ethiopia and elsewhere. The need for climate variables and role of ENSO in supplementing such variables has also been recognized in Ethiopia. However, there is limited information on climate variability and ENSO at the district level to aid in public health decision-making.

According to Dr. Adugna, since 2008, the National Metrology Agency (NMA) and the International Research Institute for Climate and Society (IRI) have been collaborating on improving climate services in Ethiopia. This initiative led to implementation of the Enhancing National Climate Services (ENACTS) initiative, and creation of the IRI Data Library (DL) NMA Ethiopia Maproom. ENACTS provides reliable and readily accessible climate data at high resolutions, and the Maproom uses ENACTS to build a collection of maps and other figures that monitor climate and societal conditions at present and in the recent past (1981-2010).

In this presentation findings of the review of the malaria epidemics and their characteristics based on the enhanced climate service data was presented. Accordingly, most districts were very sensitive to precipitation and this seasonal precipitation usually determined the probability of malaria transmission within that month. Temperature & RHs within the districts were already at an acceptable level for malaria transmission. The months most climatically suitable for malaria transmission fell within the Belg (February to March) and Kiremet (June to August) rain seasons. However, uncertainty arose when trying to determine the ENSO state that may have caused the malaria epidemic.

Above normal temperature anomalies are more likely to be associated with epidemics compared to above normal rainfall anomalies, regardless of the ENSO phase. From prior research, we found El Nino events in Ethiopia were typically associated with enhanced and increased probabilities of above average rainfall during the secondary Belg rain season (March to May). However, this was not found in the current analysis. Instead, Belg rain seasons provided below average rainfall



amounts within El Nino years and epidemics occurred regardless. On average, neutral ENSO states provided more above normal rainfall across the districts than any other ENSO state.

He also mentioned that based on the data they have come-up with two maps of Ethiopia created based on the Kiremet (JAS) and Belg (MAM) rain seasons prior to epidemics. Each map depicts the state of ENSO in each district and recorded above normal states of RF, Tmin&Tmaximum. It is also found that El Nino and ENSO conditions were more often occurred for the Kirmet rain seasons before the epidemics; neutral ENSO conditions were prevalent during the Belg rain seasons before the epidemics. However, epidemics seem to be more climatically sensitive to above normal minimum and maximum temperatures more than above normal rainfall. He recommended further analysis for more districts with epidemic threat to get a better representation of the situation.

### **Session Discussion:**

During the discussion session, a number of questions were raised: one of the questions was misuse of LLINs reported by one of the presenters. So the question was whether the nets reported to be misused were old or new nets. So the presenter mentioned that the average age of misused nets was 1 year and 3 months; so it is clear that these are not old nets. Mrs. Hiwot from the ministry added that there is no policy on how to dispose old nets both national and globally; this is a challenge and promote misuse of any net. All we could do is teach the community to properly use the nets and discourage misuse. Until 2014 the MOH actually distributed 53 million nets to the affected community and currently is distributing around 33 million nets but we don't know which nets are being misused clearly. So there is a need to define what we mean by misuse.

Similarly, the issues was raised about insecticide drugs misuse and Mrs. Hiwot stated that it is true similar insecticidal drugs are being used by the MOH for malaria control as well as by ministry of agriculture. It is clear that such use of the same drug for multiple purposes could lead to insecticidal drug resistance. However the MOH is working on drug resistance management strategy and is also working together with the Ministry of agriculture to solve such challenges. In addition, there is rumor about leakage of chemicals to the community from the spray men and this requires a strong monitoring system. We should be able to monitor the amount of chemical distributed to the districts and how much is used. However, none of this can work without the involvement of the community and other stakeholders.

Mrs. Hiwot also responded to the question posed in relation to the possible drug resistance reported by the first presenter. She said so far the MOH with EPHI has been doing drug resistance monitoring every two years and so far the susceptibility of *Plasmodium* for Coartum is more than 90% and no resistance has been reported in the country.

The second question was about the biting habit of the mosquito; according to the presentation, mosquitoes became largely outdoor biters so should we be worried. It is true we should be worried about it because the outdoor biting starts at early hours of the night when people are still out doing their domestic work. In addition, some actually stay most of the night working on their irrigation. Thus this behavior, outdoor biting could pose a challenge on our control and prevention effort depending on the population behavior.

The third question is about the use of Ivermectin for humans; the presenter mentioned that Ivermectin has been used for animal treatment for a long time now. No side effect was reported both on humans and animals. There are now literatures which encourage the use of this drug for humans and animals. We have been using it for other infectious diseases such as Filariasis thus it could be a good opportunity to try it for malaria control too.

Issues related to malaria and climate were addressed during the discussion and Dr. Adugna mentioned that using the climate data they have tested what has been postulated about climate and malaria transmission and they found that the previous epidemics were somehow related with either 'el nino' or some abnormal climate variable changes. One additional point was that data analysis was done at district level which could generate relevant information for the prevention and control of malaria at district level.

### **Session III: Malaria Epidemiology and others**

In this session, three research papers were presented on genetic diversity of *Plasmodium falciparum* isolates in South Ethiopia; Common Glucose-6-Phosphate Dehydrogenase (G6PD) Deficiency Allelic Types in Ethiopia and Entomological Study of *Anopheles* Mosquitoes during

the Malaria Transmission Season In Tolay, Ethiopia. The session was moderated by Dr. EskinderLoha from Hawassa University.

### **Genetic diversity of Plasmodium falciparum isolates based on MSP-1 and MSP-2 genes from Kolla-Shele area, ArbaminchZuria District, southwest Ethiopia**

**Hussen Mohamed**

The rationale for this study was the genetic diversity of *P. falciparum* has been extensively studied in various parts of the world. However, researches coming from Ethiopia are limited in number. It is also important to evaluate genetic profile of malaria strain following massive deployment of ITNs and free treatment with ACT.

This was a cross sectional health facility-based study carried out on stored dried blood spot collected during 2008. The blood sample was collected from children aged 6 months up to adults 20 years; these were patients with uncomplicated *P. falciparum* malaria. A total of 88 *P. falciparum* infected blood spot samples were used. Genomic DNA was extracted from the DBSs using Chelex-100® method. The initial amplification was using primers for *msp-1 and 2*; and followed by second nested PCR with allelic-type specific amplification. Allelic specific positive control (K1 and 3D7) and DNA-free negative controls were included in each set of reaction.

According to this study, out of the 59 allelic types detected in *msp1*, 42.4% were Polymorphic infections and 8.5% were Trimorphic infections. K1 was the most frequent, as it is in Gabon, Central Africa and Kenya but this was different from Sudan. The 3D7/IC1 allele family was also the most frequent in this study similar with many Africa countries except in Sudan. *msp-2* gene shows a higher polymorphism than the *msp-1* gene which was similar with the study done by Ali *et al*, 2013 in Sudan. The most prevalence fragment of FC27 was 400bp similar with Republic of Congo.

About two-third of the samples (59%) harbored multiple genotypes which is comparable to Sudan (62%). The moderate EIR value reported shows the meso-endemicity of malaria transmission. Expect heterozygosity ( $H_e$ ) was high for *msp1* (0.79), indicating a larger genotype diversity within the *msp1* locus than that of *msp2*, with  $H_e$  0.54. The study did not find a statistically significant correlation between multiplicity of infection (MOI) and mean parasite density. In summary, this genetic diversity study showed the presence of five allelic types in the study area, with dominance K1 in the *msp1* family and 3D7/IC1 in the *msp2* family. Multiple infections were observed in nearly 60% of the samples.

### **Assessment of Common Glucose-6-Phosphate Dehydrogenase (G6PD) Deficiency Allelic Types in Ethiopia**

**Ashenafi Asefa**

The G6PD deficiency is the most common genetic enzymopathy affecting 400 million people worldwide. Malaria elimination is on the current agenda in Ethiopia; several countries have done it already. One of the requirements of elimination is the killing of all forms of the parasite both in symptomatic and asymptomatic individuals. The only drug for this is an 8-aminoquinolone Primaquine or Tafenoquine. This drug has hemolysis effect in patients who are G6PD deficient. Little is known about the regional distribution of G6PD genotypes and this study attempts to fill this knowledge gap. As part of the MIS 2011, attempt has been made to collect samples for G6PD deficiency study. The genotyping was done on 1500 samples. Accordingly, the A379G mutation observed is very mild by nature and a person who is deficient for A367G mutation has close to normal (85-90%) enzyme activity; making them less susceptible to G6PD deficiency related hemolysis. Besides, of the 8.99% (138) deficient samples, 62.1% (86) samples come from heterozygous females; where the expression of the gene variable and less significant. 563T were considered in the current study because of the geo position of the country and the ethnic mix. No mutation of this type had been observed. In summary the result supports the limited historical evidence of low G6PD deficiency prevalence in Ethiopia. It revealed the absence of the predominant G6PD variants in the region and this supports the safe use of PQ especially the single low dose for PF in Ethiopia. The current study may not be conclusive but imply the need for phenotype guided genotyping study before using primaquine for *P. vivax* radical cure.

### **Entomological Study on Anopheline Mosquitoes during the Malaria Transmission Season In Tolay, Ethiopia**

#### **Wondwosen Dibekulu**

This study was conducted to determine the species composition of anophelines and assess the entomological indicators of malaria transmission and provide basic information on the behavior and habitats of vector species in the study area. The study was conducted in Tolay located in Chora Botter District, Jimma, Oromia Regional State. Malaria is one of the illness which affect the community. Longitudinal study design was implemented for five months between October 2011 and February 2012. Both larva and adult anopheline was collected based on the standard procedures; sample was collected every two weeks during the study period. Larval and adult anopheline mosquitoes were identified using morphological key and sibling species of *An. gambiae* complex (*An. arabiensis*, and *An. amharicus*) were distinguished by PCR assay. Sporozoite infection was determined by Sandwich ELISA was employed using monoclonal antibodies specific for *P. falciparum* and *P. vivax*. To determine blood meal fresh fed mosquitoes were tested using direct ELISA technique with antibody conjugates specific for human and bovine antigens.

A total of 1042 late instars of *Anopheles* larvae were collected over the five months and a total of 211 adult anophelines were identified; the majority (82%) was *Arabiensis* and the rest were

Anopheles Demeilloni, Cenerius, Christi and Coustani. The majority of the *Anopheles* were found from ponds and spillage from irrigation canal. However there was no significant difference in mean densities of *An. Arabiensis* larvae between the habitat characteristics. There was strong correlation between larvae abundance and water temperature, depth and pH with p-values <0.005.

In addition, the sibling species of the *Anophelesgambiaecomplex* were also identified. From 167 specimen of *An. Gambiaecomplex* 91% were identified as *An. Arabiensis*. Regarding their blood meal source, 23% were in-door and 73% were out-door. None of the specimens test for sporozoit infection turnout to be positive.

Woundowson concludes that *Anopheles Arabiensis* is the predominant species in larval and adult samplings in Tolay as the rest of the country. Four larval breeding sites were identified and described and the breeding sites are permanent.

Therefore, control efforts should be targeted at these breeding sites throughout the year by implementing environmental manipulation by mobilizing the community or by application of larvicides such as Bti. The number of indoor resting mosquitoes is very small as compared to those resting outdoors. This could be because of the control measures which targeted the indoor population. Thus addition emphasis to out-door intervention is also appropriate.

#### **Session Discussion:**

In this session a number of questions were raised for all presenters and discussed. The first question was about the G6PD deficiency. It was said that looking at the epidemiology of *P. vivax* is on the rise as we go to elimination phase we are going to prescribe primaquine. So what is the stand of MOH on this regard? Is there a plan to repeat this study or together with the MIS 2015? For *P. falciparum* primaquine is used for transmission interruption and there shouldn't be a problem and the WHO also recommends the use of primaquine. However for *P. vivax*, I can say the data is limited. Although our result shows very small prevalence of G6PD deficiency it might require some more research evidence in use of primaquine. Mrs. Hiwot from MOH also complements the comment made by the researcher and she mentioned that they have started procuring primaquine for *P. falciparum* treatment. But for the radical cure of vivax there is still a need for more evidence because of the possible side effect patients with G6PD may encounter. The presenter mentioned that in order to get conclusive evidence on the issue they are planning to carryout phenotypic guided genotypic study in selected sites. So if the finding suggests what we found already that has to be conclusive for the MOH to move forward.

Similar to this, there are a number of genetic variants and these are linked to clinical presentation. So is there a plan to test the samples for the specific variants? The presenter mentioned that there are 400 genetic variants and there is no plan to test all samples for these variants but we do phenotypic study and if there is deficiency further identification of the variants will be done. It is possible to set some phenotypic study sites and when we find deficiency we do further analysis of the deficiency.

Regarding the result variation between the current study and the one done by Lemu in Gambela region, the study was health facility based study and it was phenotypic study. If we manage we could try and test the sample further.

The second question was about larval management which is recommended to be used throughout the year. So is it feasible to do so? According to the presenter, in Tolay area where the study was conducted, there is an organization funded by Bio-vision. This organization provides the chemicals throughout the year. BTI has been used in many places and it is costly however, it is possible to use other alternatives such as botanicals. In Tolay there are scouts who teach the community how to manage larval habitat. There are also school interventions where students are educated on how to disrupt the habitat.

The other question was whether the permanent breeding sites are productive during wet season. The presenter mentioned that these permanent sites are productive year round and that is why the scouts actually use BTI every week to disrupt the habitat.

#### **Session IV: Malaria Epidemiology**

This session covered malaria research related to the epidemiology. There were four papers presented and they focus on malaria prevalence and associated factors; asymptomatic malaria in pregnancy; Malaria and its Association with ABO/Rh Blood Groups and a seven years trend of Malaria cases. The session was moderated by Dr. Nega Chefemo from the Abaminch University.

**Malaria prevalence and associated factors in Dilla town and the surrounding rural areas,  
Gedeo Zone, SNNPR, Ethiopia  
Eshetu Molla**

This cross-sectional study was conducted in Dilla Town to assess the magnitude of malaria and associated factors. Patients who were coming to Dilla health center for any illness were randomly selected. By excluding those patients who are already on treatment, both microscopy and questionnaire survey were carried out for 350 participants.

In this study the magnitude of malaria infection was 16% and majority of the infection was caused by *P. vivax* (62%). More than half of the infection occurred among men and 35% was among youth age 15-24 years.

The author recommends the following:

- Effort must be made to expand and sustain the combined availability and application of ITNs and IRS with source reduction measures both in Dilla town and the rural localities.
- Public health policies aimed at increasing integrated approach of malaria control should continue to support programs,
  - Particularly in rural areas, including a system to support provision of ITNs, insecticides & intermittent preventive anti-malaria treatment.

**Prevalence and Predictors of Asymptomatic Malaria Parasitemia among Pregnant Women in  
the Rural Surroundings of Arba minch Town, South Ethiopia  
Desalegn Nega**

The rationale for the study is malaria in pregnancy is still a major public health threat both for the pregnant women and their fetuses. In malaria endemic areas, Plasmodium infections tend to remain asymptomatic yet causing significant problems such as maternal anemia, low birth weight, premature births, and still birth. Little is known about the magnitude and predictors of asymptomatic malaria parasitemia among pregnant women. This study was conducted in Arbaminch Zuria Woreda among 341 pregnant mothers in rural area. Malaria parasites were detected by Giemsa-stained blood films and SD BIOLINE Malaria Ag Pf/Pv POCT [standard diagnostics, inc., Korea). Packed cell volume was determined to define anemia. Around 18.8% of the pregnant mothers were found to have malaria parasitemia. The geometric mean of parasite density was 2392 parasites per microliter ( $\mu\text{l}$ ); 2275/ $\mu\text{l}$  for *P. falciparum* and 2032/ $\mu\text{l}$  for *P. vivax*. Older age and being prim-gravida were the two factors associated with odds of having parasitemia. Anemia was also highly likely among plasmodium infected women.

## **Prevalence of Malaria and its Association with ABO/Rh Blood Groups among Blood Donors in Arba Minch Blood Bank, a Cross-Sectional Study, 2015**

**Getaneh Alemu**

This study was designed to determine the magnitude of malaria among blood donors and its association with their blood type. This study is initiated following the WHO recommendation, that every blood should be tested for malaria before given to recipient. This was a facility based study conducted among blood donors in Arba Minch blood bank. A total of 423 donors were participated in this study, from January to February 2015. Blood film was used to test for malaria parasite; for positive samples, asexual stages of malaria parasites were counted against 500 WBC on the thick film. The overall magnitude of malaria among donors was 4.1%; more than half (52.9%) were *P. vivax*. Trophozoites was the only parasite stages detected and a parasite load of 100-500 parasites/ $\mu$ l was calculated from 11 out of 17 positive donors.

Having malaria infection was significantly associated with ABO blood group. Donors with blood group O had seven times higher odds of malaria infection compared to other groups. OR: 7.0 (95% CI=1.951-24.391). Given the findings Mr. Getaneh recommended to have blood donors in endemic areas, to be screened for malaria, if not excluded. Besides, positive donors should be treated before being accepted for donation. He also recommends further studies to assess the biological basis of association between ABO blood group and malaria parasitemia.

## **Trends of Malaria Prevalence in Gewane Woreda, Afar Regional States, Ethiopia: A Seven Year Retrospective Study**

**Kedir Uregesa**

In this study seven years health facility data was reviewed for patients with microscopically confirmed malaria and with complete record at the Gewane health center. During review, patients' laboratory results, Socio demographic characteristics such as sex, age groups, and date of examination were reviewed carefully. A total of 21,211 Malaria suspected patients' blood were examined and 55.5% of them were female and 56.8% were age above 15 years. Around 18% of the slides were positive for malaria of which 66% were *P. falciparum* and 2% were mixed infections. The majority of this infection occurred among female (60%) and age 15 years and above.

The slide positivity rate in the last seven years (2008–2014) has shown reduction with slight fluctuation. The highest positive rate (28%) was recorded in the year 2009 and the lowest (6%) was recorded in the year 2012. Mr. Kedir suggests that the reduction indicates the presence of effective and persistent malaria prevention strategies in the area. Finally the author recommends provision of greater attention to female and those age 15 years and above.

**Session Discussion:**



In this session, all the presenters were junior researchers who presented their thesis work. All the comments given from the participants were related to methodology to be considered by the researchers. For instance one of the issues raised on the first presentation was a malaria prevalence of 16% which is very high compared to any of the studies done in this country so far. The issue was that this was a facility based study and measuring prevalence based on facility study was not considered appropriate. However, the researcher was advised to report it as magnitude. Besides, the researcher might also look at if there was any outbreak around the data collection time. The other methodological point raised was the issue of sample size. For some of the presenters the confidence interval reported for the odds ratio was very large and the senior researchers emphasized that this should have been justified in the study or be considered as limitations. In addition, comparison of study findings with other findings from different setting was also commented.

### **Session V: Malaria Treatment (Clinical Pharmacology)**

The session was moderated by Dr.Nega Chefamo from the University of Arba Minch. Four studies were presented in this session.

The first presentation by Solomon M. Abay was entitled “Blocking plasmodium transmission from the host to the vector by sesquiterpene lactones from *vernoniaamygdalina*”. The aim of the study was to characterize effects of *vernoniaamygdalina* fractions and compounds of transmission related to stages of plasmodium and concluded that *V. amygdalina* leaves contains molecules affecting sporogonic stages of *Plasmodium*, evidencing its potential for drug discovery and for the development of standardized phytomedicine.

The second presentation was “Antimalarial activity of the aqueous extract of the latex of *Aloe Pirottae*berger (Aloaceae) against plasmodium berghei in mice” by Tesfa Tekle a pharmacologist from school of medicine and public health of Arba Minch University. The rationale of this study was pharmacological evaluation of the extract from antomalarial plant, *A.Pirottae*, with the hope of getting a new source of antimalarial drug. This study concluded that the extract had minimal curative effect but showed better prophylactic activity which support the traditional antimalarial claim of *A.Pirottae* and show that, if widely studied, the plant, along with its safety profile, could be used as a potential source of new antimalarial drug.

The third presentation of the session was “In vitro anti-malarial activity of hydro-alcoholic crude extract and its fractions of root of *Gnidiastenophylla*Gilg. on plasmodium falciparum and in vivo parasitemia suppression studies on mice using the fractions on plasmodium berghei” by Samson Sahile a Pharmacologist from school of medicine and public health of Arba Minch University. The objectives of the study was to evaluate the in vitro and in vivo anti-malarial activity of the root of

*G. Stenophylla* and concluded that extract from the plant possessed significant antiplasmodial activity as seen in their ability to suppress *P.berghei* infection in mice and with good in vitro result.

The last presentation of the session was “Invivo anti-plasmodial and toxicological effect of crude Ethanol extract of echinopskeberichomesfin traditionally used treatment of malaria in Ethiopia” by Alemayehu Toma a Pharmacologist from school of medicine and public health of Hawassa University. The main objective of this study was to evaluate the anti-malarial effects of echinopskebericho in animal models. The findings of this study confirmed that the traditional usage of the plant to combat malaria in Ethiopian folk medicine.

#### **Session Discussion:**

Question regarding the methodology, procedures used in the study and selection of those plants for antimalarial medicine raised from the participant following the presentation. Comments and suggestions were also forwarded to the researcher. Some of the questions were; Are the plants widely popular in Ethiopia? Why only female mice for some tests and only male mice for some tests used? Regarding the prophylactic use of the plants, which stage of the parasite is the target? The presenter address the question as follow; the plants used in all of the studies are widely available in Ethiopian society and being used as a traditional medicine for long. Female mice were used to test the acute toxicity of the plant because as studies showed female mice are more susceptible and prone for toxicity and for anti-malarial study only male mice is used because some studies indicated that some amount of estrogen have shown to increase anti-immune response against malaria infection; if female mice used for anti-malarial study there could be interaction between the effect of the drug and the effect of the estrogen since estrogen may increase immune response against the parasite that might cover the effect of the extract for that only male mice used. Regarding the prophylactic test; there was no sporozoic stage infection during the study but it is possible to target at different stage of the parasite and in this study we target the merozoite stage.

#### **Session VI: Malaria Diagnosis**

The session was moderated by Dr Adugna from Ethiopian public health institute. Two studies were presented during the session.

The first study presented was “Efficacy of Artemether-Lumefantrine since adopted as a first line treatment for uncomplicated plasmodium falcipharum malaria in Ethiopia in 2005: Summary report 2007-2014” by Moges Kassa from Ethiopian Public Health Institute. The aim of the study was to assess the cure rate of Artemether-Lumefantrine in patients with uncomplicated plasmodium falcipharum in selected sites. The study finally concluded that the recommended

regimen of Artemether-Lumefantrine in Ethiopia still working very well in the study localities after more than 9 years of wide use as first line treatment in the country.

The second presentation of the session by Leykun Demeke was entitled “Assessment of malaria microscopy diagnosis performance of laboratory professionals in Addis Ababa Public health facilities”. The study aim to assess the performance of malaria microscopy diagnosis in selected public health facilities. The findings of the study suggested that detection is higher than identification of species and misdiagnosis of malaria species is higher among untrained laboratory professional that trained ones.

### **Session Discussion:**

Matters related to the sample size, data collection methods and quality of laboratories were the focus area during this session discussion time. Many participants were concerned about the result that showed resistance of Artemether-Lumefantrine in two sites of the study area. Participants also mentioned that the ministry of health should consider such research evidences seriously and take the necessary measure since Artemether-Lumefantrine is the first line treatment in the country.

## **Session VII: Malaria Prevention**

Three studies focused on LLIN presented during session. The session was moderated by Dr.MekonenYohannes from Mekele University.

The first study presented by Birhanu Kenate was entitled “Assessment of prevalence of LLINs ownership by householders, utilization among the household members and factors affecting utilization in Bako District, West shoa zone, oromia region, Ethiopia, June 2014”. Despite different interventions, malaria is continuing to be one of the major public health problem in the district and there is lack of evidences regarding utilization of LLIN’s for health planner and decision maker. Thus, this study aim to assess the proportion of LLIN ownership by household, utilization and factors affecting utilization in Bako district, West shoa zone, Oromia region. This study concluded that the universal coverage of LLIN in the area was encouraging compared to most findings in this country and LLIN utilization was by far below the national target.

The second Presentation made by Dr Seblewengel Lemma from ACIPH was “Monitoring of attrition, physical durability and insecticidal activity of LLIN in Ethiopia: A longitudinal study baseline report”. This study is a longitudinal study aims to monitor LLIN survivorship/attrition and reason for net attrition, to evaluate physical integrity of LLINs, to determine the duration of insecticidal chemical concentration and activity of LLINs in four regions (Tigray, Amhara, Oromia and SNNPR) of Ethiopia. According to the baseline assessment; majority of nets were not used in the previous night, HEW are important source of information regarding net use and repair, main

reason for losing net is giving away to relatives and nets from previous campaign or other sources are still in use.

The last presentation of the session was Physical Durability of LLIN for malaria prevention in South-Central Ethiopia: Follow up study” by Tarekegn Solomon from Hawassa University school of Public Health. Having evidence on physical durability of LLIN at field condition is helpful for future LLIN purchase decisions and to estimate the necessary rate of replacement in continuous LLIN distribution. The objective of this study was to assess the physical durability of LLIN and associated factor in south-central Ethiopia. The study concluded that there are high number of nets lost and no longer used for sleeping in received households in the first 6 months.

#### **Session Discussion:**

Most of the questions raised following the presentations were focused on the selection criteria of the study area, issue related to any net replacement plan and the need for doing a bio-efficacy survey.

### **Session VII: Way Forward – Discussion on Malaria research network TOR and future direction**

This was the final session of the symposium, which focused on the network’s future direction. Dr. Ayele described the process for discussion and where the focus should be. Accordingly the first question posed for the participants was, did the network achieve its objective?

Dr. Wakgari mentioned that this is one of the most important initiatives started five years ago and it was led by Addis Ababa University, and then supported by PMI. In principle, the network was important but for some reason it did not progress as it should be. Now it is revitalized again but we need the network to bring other researchers on board including working on other infectious diseases and experts from different disciplines. Make it a center for malaria research. Looking at the rationale, we may expand it further; the tasks are exhaustive but we need to upgrade the scope now. We need a list that is achievable in our context.

The other question posed for the discussion was, who should host the network? For the network to grow, it requires commitment and support from partners.

Mr. Seife from FMOH stated that it is high time to raise this issue; there is a team established in M&E and this team will strongly follow research undertakings in the country. As we are now in the pre-elimination phase we need more research output.

Mrs. Hiwot from PMI said that we had a discussion with AAU and we promised to have the office at AAU, but again this is open for all Universities and other institutes.

Dr. Adugna, the TOR needs to be revised in many aspects. We have many researchers on malaria, and also institutions. Coordinating these researchers and their institutions will be the responsibility of the network. From the nature of EPHI, we have active research and its new role to coordinate research activities; this should be given to EPHI. Operational research is coordinated by EPHI and they ready to take an active role in the network.

Mr. Behailu also mentioned that he agree that the TOR requires revision. He considers the Arba Minch as a stakeholder. This has to be strong and should take initiative to work with the network and the researchers. We assume ourselves to be part of the coordinating body.

Mr. Fekadu said he was there when the first symposium was launched. So the objective of the network is partially achieved as the platform. When it comes to policy, policy brief should be prepared. There are so many research outputs still on the shelf. There should be a body which revises these and makes them available. We have researchers from AMU because of the geographic advantage; it would be good to include AMU as part of the committee.

Dr. Asnakew: we have to do stakeholder analysis; for instance, there are universities that are not represented here. Regions must be represented here too. If you want to link research to programs, regions must be actively engaged in this process. It is also good to recruit potential candidates because there might be people who do not know the presence of the network.

Mr. Asefaw: this is my first time to attend although I am not that far. So many students are struggling to get information especially on MIS. Although we are saying the data are accessible for everyone. The data is considered as institutional currency. First of all we have to share information and be transparent. This has to be the responsibility of this network and need to solve such problem.

Dr. Delnesaw: Malaria research has been conducted in a very fragmented way. There was no way to get information on malaria research both published and in the gray literature. There is now a steering committee; let's work on the steering committees responsibilities. This committee should develop a strategic plan and the organogram has to be there. So we have to name people who could do this. At the end we need to have a full document with the strategic plan.

Dr. Adugna:

EPHI will take a leading role but we need to decide when to meet

Dr. Wakgari: what will the coordinating committee do?

Fix the number of institutions to be part of this committee. For instance, Aklilu Lemma is not included; Universities such as Arba Minch are not included. We may not need to meet every time because we can do activities through email and conference calls.

Dr. Asnakew:

The steering committee should identify the universities and representatives. There are more than 30 universities and these could be classified in to clusters and we can select one university per cluster. We can also consider regions and bring them in to this network.

Mr. Sheleme: We can add AMU to the coordinating body and with the current members of the steering committee. We can also consider two institutions, namely the Aklilu Lemma and Harman Hansen research institutes. The rest could be managed by the steering committee. The members could be those who are in this room. So the committee can call a meeting to finalize the TOR and bylaws, and then communicate to members as we have their list now.

## Annex

### Annex 1: List of Participants

S.No	Participant Name	Organization/Institute
1	Aman Yesuf	AMU
2	Yemane Berhane	ACIPH
3	Wakgari Desessa	AAU
4	Meshesah Balked	AAU
5	Delenesaw Yeuhane	Jimma University
6	Mekonnen Yohannes	Mekelle University
7	Seife Bashaye	FMO
8	Firedawek Getahun	AMU
9	Desta Haftu	AMU

10	Getahun Alemu	AMU
11	Berhanu Kenate	WSZHD
12	AdmasaTassew	AMU
13	Fikadu Masseba	AMU
14	Melaku Mata	AMU
15	Hussain Mohammed	EPHI
16	Ashenaf Assefa	EPHI
17	Tessema Awano	Malaria Consortium
18	Yonas Wuletaw	EPHI
19	Aberham Yaka	
20	Kider Urgesa	Haramaya Universty
21	Nejib Mohammed	AMU
22	Tarekgn Solomon	Hawassauniversty
23	Endny Ali	NSC
24	Edlauut Abera	AMU
25	Fanuel Zewde	ICAP-MLDM-P
26	Alemayehu Hlmiceel	AMU
27	TadelMenday	AAU
28	BehailuTsegaye	AMU
29	Samson Sahile	AAU/AMU
30	Dr.Negnssie Tadege	AMU
31	Dr.Nega Etufa	CMHS
32	Zonima Gzerdo	CMHS
33	Tigst Yezmu	CMHS
34	Woyneshet Gelage	Bahirdar Reg.Lab
35	Dr.Habte Limie	AMU/AMGH
36	Belete Sumudd	G/Goffa ZHD
37	Misrak Abraham	AMU
38	Dr.Addisalem Mulatu	AMU
39	Dr.Desalegn Mechal	AMU
40	Dr.Endalkachew Desta	AMU
41	Dr.Biruk Abera	AMU
42	Dr.Fikrtn Diy	AMU
43	Solomon Kinde	AMU
44	Dr.Fantahun Wientl	AMU
45	Feseha G/Slassie	AMU
46	Wanzahun Godan	AMU
47	Alemayehu H/Michalel	AMU
48	Gemechu Kejela	AMU

49	AbgahunSImichel	AMU
50	Live Lemma	AMU
51	Bikile Sibolch	AMU
52	Ashakew Kebede	Path-MACEPA
53	Asefaw Getachew	Path-MACEPA
54	Mistir Sisay	AMU
55	Henok Bekele	AMU
56	Fitsum Dandura	AMU
57	Behaylu Merdekes	AMU
58	Feleke G/Meske	AMU
59	Dr.Rerie Toles	AMU
60	Dr.Nebso Eov	AMU
61	Lale Zemedede	AMU
62	Habtamo Salula	ASHA
63	Gistane Ayno	AMU
64	Addisu Chenbaro	AMU
65	Ephrem Tefera	Private
66	Firew Abayneh	AMU
67	Dr.Segin Buko	AMU
68	Yared Godine	AMU
69	Dr.Yohas Abera	AMU
70	Dr.Tadisu Hantn	AMU
71	Addis Petros	AMU
72	TagIn Hglh	AMNEF
73	Dr.Gezahegn Dinite	AMU
74	Alemu Tessema	AMU
75	Aspiron Hangibayne	AMU
76	Hiwot Selomon	FMOH
77	Mekidem Kassa	AMU
78	Adugna Wayessa	EPHI
79	G/Kidan G/Michalel	AMU
80	Yinater Workineh	AMU
81	Abera Mekasha	AMU
82	Tsegaye Yohans	AMU
83	Abinet Teshome	AMU
84	Wondemneh Mekenie	EPHI
85	Feven Wudneh	Dilla University
86	Moges Kassa	GPTH
87	Wondwesen Dibelch	D/Brhan University



88	Desalegn Nega	EPHI
89	Eshetu Molla	Dilla University
90	EskinderLoha	Hawassa University
91	Taye Gari	Hawassa University
92	Sisay Teka	AMU
93	Kashun Leuety	AMU
94	Yehenew Asmamaw	AAU
95	Solomon Mengestu	AAU-MF
96	Abebaw Misker	AMU
97	Bebdgch	AMU-NSN IOF
98	Alemayehu Tome	Hawassa University
99	Alemayehu Taye	AMU
100	Dinkalem Getahun	AMU
101	Mohamed AmaMame	AMU
102	Leywanu Demeke	ICAP
103	Woynshet Glts	CMHS
104	Mastewal worku	AMRHB
105	Dr.Ashebir Zewde	AMU
106	Dr.Tesfay Hailet	AMU
107	TesfayTekle	AMU

## Annex 2: Schedule

### Malaria Research Forum Aug 25-26, 2015

#### Schedule

Time	Topics	Presenters
<b>Day 1</b>		
08:30- 09:00	Registration	Arba Minch University/ACIPH
<b>Session I: Moderator and Master of Ceremony – Mr. Wanzahun Godana</b>		
09:00- 09:10	Welcome	College of Health Sciences – Arba Minch University
09:10 -09:20	Key note address	PMI
09:20- 09:30	Key note address	EPHI
09:30- 09:40	Opening speech	Guest of Honor (Arbaminch University President)
09:40-10:00	SMMES project background: Malaria research network	ACIPH/Dr. Ayele Zewde
10:00-10:30	Operational research on Malaria	Prof. YemaneBrehane
10:30- 11:00	Tea Break	Organizers
<b>Session II: Current malaria affair/ Moderator – Dr. Wakagari Deressa</b>		
11:00-11:15	The national malaria strategy and malaria related information gap	1. Mrs. Hiwot Solomon
11:15-11:30	Malaria situation in SNNP region	Zone malaria focal person/ AMU
11:30 -11:45	Malaria vector control in south Ethiopia: Challenges, opportunities and history of malaria research in Arba Minch	2. Mr. FekaduMassebo
11:45- 12:00	Review of Malaria Epidemics in Ethiopia using Enhanced Climate Services (ENACTS)	3. Dr. Adugna Woyessa
12:00-12:30	Discussion	Participants
12:30- 01:30	Lunch	

<b>Session III: Malaria Epidemiology and others / Moderator: Dr. Eskinder Loha</b>		
01:45 - 02:00	Genetic diversity of Plasmodium falciparum isolates based on MSP-1 and MSP-2 genes from Kolla-Shele area, Arbaminch Zuria District, southwest Ethiopia	1. Hussein Mohammed
02:00 - 02:15	Assessment of Common Glucose-6-Phosphate Dehydrogenase (G6PD) Deficiency Allelic Types in Ethiopia	2. Ashenafi Asefa
02:15 - 02:30	Spatiotemporal clusters of malaria cases at village level, northwest Ethiopia	3. Kassahun Alemu
02:30- 02:45	Entomological Study On <i>Anophele</i> Mosquitoes During the Malaria Transmission Season In Tolay, Ethiopia.	4. Wendwesen Dibekulu
02:45-03:15	Discussion	Participants
03:15-03:30	Tea break	Organizers
<b>Session IV: Malaria Epidemiology/ Moderator: Dr. Delenesaw Yewhalaw</b>		
03:30- 03:45	Malaria prevalence and associated factors in Dilla town and the surrounding rural areas, Gedeo Zone, SNNPR, Ethiopia	1. Eshetu Molla
03:45-04:00	Prevalence and Predictors of Asymptomatic Malaria Parasitemia among Pregnant Women in the Rural Surroundings of Arbaminch Town, South Ethiopia	2. Desalegn Nega
04:00-04:15	Prevalence of Malaria and its Association with ABO/Rh Blood Groups among Blood Donors in Arba Minch Blood Bank, a Cross-Sectional Study, 2015	3. Getaneh Alemu
04:15-04:30	Trends of Malaria Prevalence in Gewane Woreda, Afar Regional States, Ethiopia: A Seven Year Retrospective Study	4. Kedir Urgesa
04:30- 05:00	Discussion	Participants
<b>Day 2</b>		
<b>Session V: Malaria Treatment (Clinical Pharmacology)/ Moderator: Dr. Nega Chefemo</b>		
09:00- 09:15	Blocking Plasmodium transmission from the host to the vector by sesquiterpene lactones from <i>Vernonia amygdalina</i>	1. Solomon M. Abay
09:15- 09:30	Antimalarial Activity of the Aqueous Extract of the Latex of <i>Aloe pirottae</i> Berger. ( <i>Aloaceae</i> ) Against <i>Plasmodium berghei</i> in Mice	2. Tesfa Tekle
09:30- 09:45	In vitro anti-malarial activity of hydro-alcoholic crude extract and its fractions of root of <i>Gnidiastrophylla</i> Gilg. On <i>Plasmodium falciparum</i> and in vivo parasitemia suppression studies on mice using the fractions on <i>Plasmodium berghei</i> .	3. Samson Sahle

09:45-10:00	Invivo Anti-plasmodial and Toxicological Effect of Crude Ethanol Extract Of EchinopsKeberichoMesfin Traditionally Used in Treatment of Malaria in Ethiopia	4. Alemayehu Toma
10:00 - 10:30	Discussion	Participants
10:30 - 11:00	Tea Break	Organizers
<b>Session VI: Malaria diagnosis: microscopy /Moderator: Dr Adugna Woyessa</b>		
11:00-11:15	Efficacy of Artemether-Lumefantrine since Adopted as a First Line Treatment for Uncomplicated Plasmodium Falciparum Malaria in Ethiopia In 2005: Summary report 2007-2014.	1. Moges Kassa
11:15-11:30	Assessment Of Malaria Microscopy Diagnosis Performance Of Laboratory Professionals In Addis Ababa Public Health Facilities	2. Leykun Demeke
11:45-12:15	Discussion	Participants
12:15-01:30	Lunch	Organizers
<b>Session VII: Malaria prevention/Moderator: Dr. MekonenYohannes</b>		
01:30- 01:45	Assessment of prevalence of LLINs ownership by householders, utilization among the household members and factors affecting utilization in Bako District, West Shewa, Oromia/;- Ethiopia June 2014	1. BrehanuK.Sori
01:45- 02:00	Monitoring of attrition, physical durability, and insecticidal activity of - long-lasting insecticidal net in Ethiopia: A longitudinal multi-site study: the baseline	2. Seblewengel Lemma
02:00- 02:15	Physical Durability of Long-Lasting Insecticidal Nets for Malaria Prevention in Central Ethiopia: A Research Proposal.	3. Tarekegn Solomon
02:15-02:45	Discussion	Participants
02:45- 03:15	Tea break	Organizers
03:15 -04:45	Way Forward – Discussion on Malaria research network TOR and future direction	Participants
04:45-05:00	Closing remarks	PMI/EPHI/ACIPH/AMU

**Abstracts selected for Poster presentation**

	Epidemiological analysis of malaria outbreak in Ankesha District, Awi zone Amhara Region, Ethiopia, 2012: weaknesses in control measures and risk factors	1. Mastewal Worku
	Evaluation of the efficacy of ArtemetherLumefantrine (Coartum®) in patients with uncomplicated P. falciparum malaria in GendeWuha, North West Ethiopia	2. FevenWudeneh
	Assessment of therapeutic efficacy and safety of artemether-lumefantrine (Coartem®) in the treatment of uncomplicated Plasmodium falciparum malaria patients in Bahir Dar district, Northwest Ethiopia: an observational cohort study.	3. Yehenew A. Ebstie
	Current and cumulative malaria infections in a setting embarking on elimination: Amhara, Ethiopia	4. Woyneshet G. Yalew
	Mass testing and treatment for malaria in moderate transmission areas in Amhara Region, Ethiopia	5. AsfawGetachew
	Case investigation with reactive focal testing and treatment for malaria in a low-transmission area in Amhara Region, Ethiopia	6. AsankewKebede
	Insecticide resistance in Anopheles arabiensis to different insecticides: data from ten sentinel sites of Ethiopia	7. WondemenheMekuria

Annex 3: Abstracts