



# Ethnomedicinal knowledge, belief and self-reported practice of local inhabitants on traditional antimalarial plants and phytotherapy

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## ABSTRACT

**Ethnopharmacological relevance:** This paper reveals the trend of knowledge and practice of traditional antimalarial plants (TAPs) to prevent/treat malaria.

**Materials and methods:** Stratified, systematic random sampling was adopted. The ethnomedicinal survey was conducted between January and March 2011 by involving the selected 371 household members on knowledge and practice of TAPs by administering a pre-tested questionnaire.

**Results:** Overall, 54.4% respondents had adequate awareness and usage custom of TAPs and 16 types of plant have been most commonly known and employed by the respondents to prevent/treat malaria. Leaves (57.2%) were most commonly used plant part to prepare traditional antimalarial phytotherapy remedies. Decoction was one of the most commonly used methods to administer TAPs. The chi-square test result revealed that a significant association is found between the usage custom of traditional antimalarial plants and gender ( $P$ -value = 0.0282), age ( $P$ -value = 0.0024), educational status ( $P$ -value = 0.0295), and monthly income ( $P$ -value = 0.0001), although not with the ethnicity ( $P$ -value = 0.7933) of the respondents. **Conclusion:** TAPs usage is an integral part of the tradition and custom of the Ethiopians. However, nearly half of the respondents have had lack of awareness about TAPs and majority of them are reluctant in exercising either due to its ineffectiveness or its bitter taste. Therefore, further laboratory-based research is extremely imperative to identify their antiplasmodial activity and bioactive molecules which could pave the way to formulate the novel affordable as well as accessible potent antimalarials in the near future.

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## 1. Introduction

Malaria is one of the most common mosquito-borne diseases in the tropical and subtropical countries, particularly in the sub-Saharan Africa (Karunamoorthi and Ilango, 2010). The recent WHO Malaria Report (2011) estimates that 3.3 billion people were at the risk of malaria in 2010, although of all geographical regions, populations living in sub-Saharan Africa (SSA) have the highest

risk of acquiring malaria; among 216 million episodes of malaria in 2010, of which approximately 81%, or 174 million cases, were observed from the African Region. There were an estimated 655,000 of malaria deaths in 2010, of which 91% were from Africa. Resurgent vector-borne diseases result in a high burden of disease, estimated as about 56 million disability-adjusted life years (DALYs) (TDR, 2009).

A cyclic epidemic with a period of five to eight years occurs in most parts of the Ethiopia following with the climatic changes (MOH, 2004). An estimated 68% (50 million people) of the population lives in areas at the risk of malaria. Malaria was reported as the primary cause of health problems in 2004–2005 accounting for 17% of out-patient visits, 15% of hospital admissions and 29% of in-patient deaths (CSA, 2006). Despite, the availability of effective interventions, malaria is remains one of the most important causes of maternal and childhood morbidity and mortality (Karunamoorthi et al., 2010a). In Ethiopia, malaria is not only a health issue but also a food-security and environmental issue. Since the peak transmission season coincides with the major cultivating and harvesting season of the year and has tremendous impact on the agriculture productivity (Karunamoorthi and Bekele, 2009), it

**Abbreviations:** ACT, artemisinin combination therapy; ART, artemisinin-based derivatives; ATMS, African Traditional Medical System; CSA, Central Statistical Agency, Federal Democratic Republic of Ethiopia; DALYs, disability-adjusted life years; HM, herbal medicine; IRS, indoor residual spraying; ITNs, insecticide treated nets; MOH, Ministry of Health, Federal Democratic Republic of Ethiopia; SSA, sub-Saharan Africa; TAPs, traditional antimalarial plants; TCM, traditional Chinese medicine; TDR, tropical diseases research; TK, traditional knowledge; TM, traditional medicine; UN, United Nations; WHO, World Health Organization.

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gradually shrinks the household income and eventually lessens the socio-economic development of the nation at large.

At present, more than 80% of the world's population relies on traditional healing modalities and herbals for primary health care and wellness (WHO, 2002). In fact, the world market for herbal medicines based on traditional healing knowledge was estimated to be \$60 billion in 2000 (United Nations, 2000). In rural areas of Africa and elsewhere in developing countries, traditional medicines (TM) are often trusted and are affordable and accessible, as they are made from locally available plants or other elements (Kitua and Malebo, 2004). It has been estimated that 80% of Africans rely upon traditional remedies to supply their healthcare needs and the continent has at least 30,000 medicinal plants (Pratt, 1989).

Most of the malaria infections especially in sub-Saharan Africa are treated in peripheral health centers or remote villages, where facilities are limited (de Ridder et al., 2008), and the traditional medicinal plants have clearly play a pivotal role in the malarial treatment for centuries (Dharani et al., 2010). Ethiopia has an enormous resource of plant species that are used as traditional medicine (TM). Among the 7000 higher plants species that are known to exist about 800 of them are employed in the traditional health care and 60% of plants are said to be indigenous with their healing potential (Wolde and Gebre-Mariam, 2002; Mesfin et al., 2005). In Ethiopia, 70% of human and 90% of livestock population depend on traditional medicine (Bekele, 2007), as a source of health care especially in rural areas. Provision of modern health care through the construction of new hospitals, health centers and health posts, imported drug supplies and training of doctors and nurses are of little value at present to majority of the rural population (over 40 million people) (Agbovic et al., 2002).

The traditional health care is in fact culturally deep rooted with oral and written pharmacopoeias. Ethiopian traditional life is painted with the hallmark of widespread use of traditional medicinal plants with various levels of sophistication within the indigenous medicinal lore. Notwithstanding, it is also blended with religious thinking and various beliefs (Bekele, 2007). Traditional knowledge built upon the long experiences of people has been adopted in various social, economic, environmental, spiritual and political backgrounds. Since traditional knowledge is developed through a long trial and error, this could guide search for new drugs too. There is a serious concern about the loss of this traditional knowledge throughout the world in the last few years (Brockman et al., 1997; Twang and Kapoor, 2004; Karunamoorthi et al., 2009a,b).

The documentation of the traditional medicinal plants used by the people in Ethiopia is limited compared to the extent of variety of cultures and the diversity of the terrain. Furthermore, the majority of studies conducted to document are focused only on the herbalists and Ethiopian medico-religious manuscripts (Abebe and Ayehu, 1993) without regarding the existing traditional knowledge and practices of common people. This trend might ignore the study on the level of knowledge in the society and affect the documentation and the research on the medicinal plants conserved and administered by the local people (Teklehaymanot, 2009). Although numerous studies on the medicinal plant resources of Ethiopia have been conducted, only a limited number of studies have been documented the extent and types of herbs used to treat malaria by the vast majority of the rural population.

Indeed the wide-spread *Plasmodium falciparum* chloroquine-resistant strains have created severe set-back in malaria control. Although currently artemisinin-based combination therapy (ACT) serves a pivotal role to combat malaria, they are mostly inaccessible and unaffordable in the resource-limited settings. Besides, there are signs of resistance to artemisinins emerging in Thai-Cambodian border and this has led to explore the low-cost and easily accessible plant species as a potential source of antimalarials.

In addition, the use of traditional antimalarial plants is one of the prehistoric age-old customs and it is largely conceived by long-term observation and trial and error mode. Ethnic groups are the repositories of the knowledge on herbal remedy which need to be documented and tapped properly. In this viewpoint, the present survey has been undertaken to assess the knowledge and practice of local inhabitants towards traditional antimalarial plants in Jimma town. The outcome of the present study could pave the way to identify the trend of traditional herbal remedies and to generate the database in order to explore plant species as a potential source of antimalarials by the researchers and decision-makers in the near future.

## 2. Materials and methods

### 2.1. Description of the study setting

Awetu mendera Kebele (smallest administrative unit in Ethiopia) is located within the Jimma town, which is 352 km away from Addis Ababa, the federal capital city of Ethiopia. The town altitude is about 1850 m above the sea level and the mean annual temperature is 18.5°C. The area has an estimated total number of households and population of 2585 and 11,111, respectively. Malaria is one of the leading causes of morbidity and mortality in the study area. Because of the prolonged period of exposure to malaria, the residents have traditionally been employing several antimalarial plants to prevent/treat malaria.

### 2.2. Study design and study population

A cross-sectional descriptive study was carried out to assess the knowledge and practice of traditional antimalarial plants. The source population was all the households established in Awetu mendera kebele (village). The stratified, systematic random sampling was applied for the selection of 371 households from the total of 2585 households. The people were observed to work mainly as informal, marginal and unskilled workers. The predominant activities of the community members are trade, agricultural farming, civil and non-governmental service.

### 2.3. Interview

The interview was carried out by involving 371 household members in the study area. To improve the quality of the data, pre-testing of the questionnaire was carried out prior to the actual data collection. The questionnaire was tested on ten respondents by the enumerators, in an area different from the study area, but with the similar socio-demographic pattern. One adult from each household was interviewed on the knowledge and traditional uses of antimalarial plants, using a pre-tested questionnaire specifically designed for this purpose. Male and female respondents from all age-groups were included. To minimize biased information and variables the questionnaire prepared in English language was translated into native local languages Oromifa or Amharic to make it easy to understand and to administer by interviewers and interviewees.

### 2.4. Ethical considerations

The study was approved by the ethical clearance committee of the Jimma University, Jimma, Ethiopia. Before the commencement of the survey, meetings with community health workers, community leaders and members of the neighborhood associations were held in which the objectives of the survey were clearly explained. Written consent was obtained from each study participant. Every participant was assured to withdraw the interview at any phase if

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