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Medicinal plants and finished marketed herbal products used in the treatment of malaria in the Ashanti region, Ghana

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ABSTRACT

Ethnopharmacological relevance: Ethnobotanical survey was performed to document medicinal plants employed in the management of malaria in the Bosomtwe and Sekyere East Districts of the Ashanti Region (Ghana), in comparison with the plant ingredients in herbal antimalarial remedies registered by the Ghana Food and Drug Administration.
Materials and methods: Two hundred and three (203) herbalists from 33 communities within the two districts were interviewed on medicinal plants they use to manage malaria. A literature search was made to determine already documented plants. In addition, 23 finished marketed herbal products indicated for the management of malaria were identified and their labels examined to find out which of the plants mentioned in our survey were listed as ingredients and whether these products are in anyway regulated.
Results: Ninety-eight (98) species of plants were cited for the management of malaria. In comparison with literature citations, 12 (12.2%) species were reported for the management of malaria for the first time and 20 (20.4%) others for the first time in Ghana. Twenty-three (23) finished marketed herbal antimalarial products examined contained aerial or underground parts of 29 of the plants cited in our survey as ingredients. Twenty-two (22) of these products have been registered by the Ghana Food and Drugs Authority, four (4) of which were included in the recommended herbal medicine list for treating malaria in Ghana.
Conclusion: This study provides new additions to the inventory of medicinal plants used for the management of malaria and reports the commercial availability and regulation of finished marketed labelled herbal products intended for the treatment of malaria in Ghana.

1. Introduction

Malaria is a life-threatening disease caused by protozoan parasites of the genus Plasmodium, whose transmission through the Anopheles mosquito is affected by climate and geography (Snow et al., 2005). Approximately half of the world's population is at risk. The greatest impact of the disease is felt in Sub-Saharan Africa, where most malaria cases and deaths occur (WHO, 2014). However, Asia, Latin America, and to a lesser extent the Middle East and parts of Europe are also affected. In 2013, 97 countries and territories had ongoing malaria transmission (WHO, 2014). In Ghana, there were about 8.4 million suspected cases and 2500 attributed deaths in 2013 (Ghana population: 25.9 million) (WHO, 2014), the main parasite responsible being *Plasmodium falciparum* (WHO, 2013b). The disease places significant financial hardships on both households and the national economy. It was estimated

Abbreviations: ACT, artemisinin-based combination therapy; BD, Bosomtwe District; FDA, Food and Drug Authority; GDP, Gross Domestic Products; KNUST, Kwame Nkrumah University of Science and Technology; PRK, the percentage of respondent with knowledge about a particular plant species; SED, Sekyere East District; WHO, World Health Organization

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that 1% increase in the malaria morbidity rate will slow down the rate of real gross domestic products (GDP) growth by 0.41% (Asante and Asenso-Okyere, 2003).

WHO's approaches to malaria control are multi-faceted, involving prevention and case management (WHO, 2011). Among the prevention methods are control of the malaria vector using long-lasting insecticidal nets and indoor residual spraying: These interventions work by reducing both the human–vector contact and the lifespan of female mosquitoes (White et al., 2014). The other is the intermittent preventive treatment which is the administration of a full course of an effective antimalarial treatment at specified time points to a defined population at risk of malaria, regardless of whether the recipients are parasitaemic, with the objective of reducing the malaria burden in the target population (WHO, 2011). Case management, on the other hand, involves the treatment of confirmed malaria cases using WHO recommended chemotherapy for malaria (WHO, 2011). Currently, treatment with artemisinin-based combination therapies (ACTs) are the major drugs for the treatment of malaria (WHO, 2010b). However, ACTs are faced with some challenges, among which are their high cost (Mutabingwa, 2005) and the emerging parasite resistance to artemisinin-based drugs (WHO, 2010b).

In Ghana, where malaria is a major developmental challenge, many people use medicinal plants for treatment, especially in rural communities. Plants used in malaria and fever account for 6% of the medicinal plants of the Ghanaian domestic market (Van Andel et al., 2012). Many of these plants have been used in the management of the disease for centuries and numerous studies have documented this indigenous knowledge in some localities (Abbiw, 1990; Asase et al., 2005, 2010; Asase and Asafo-Agyei, 2011; Asase and Oppong-Mensah, 2009; Dokosi, 1998; Mshana et al., 2001). However, some sites are yet to be studied, leaving a knowledge-gap in the documentation of these medicinal plants. Besides, the face of herbal medicine practice has changed over the years; some practitioners have moved from the hitherto extemporaneous preparations of home-made remedies to commercial production of finished/mixture marketed herbal products, made of a single or combination of medicinal plants.

We surveyed the medicinal plants used by the indigenes of the Bosomtwe and Sekyere East Districts of the Ashanti region of Ghana to manage or treat malaria. The data obtained were compared with similar studies from other parts of Ghana, Africa and the world. We also examined marketed herbal antimalarial products distributed in some health facilities in Kumasi, the Ashanti Regional capital of Ghana, to ascertain which plants mentioned in our survey are ingredients and to assess the regulatory status of these products.

2. Materials and method

2.1. Study areas

The study areas encompass 2 districts of the Ashanti Region, Ghana: Bosomtwe and Sekyere East Districts (Fig. 1). Bosomtwe District lies within latitudes 6° 43′ North and longitudes 1° 46′ West and it spreads over a land area of 68,179 km^2. It has an estimated population of about 94,000 (Ghana Statistical Service, 2010). The Sekyere East district, on the other hand, lies between latitudes 6° 45′ and 7° 32′ North and longitude 0° 22′ West. It has a land area of about 4231.4 km^2 and an estimated population of about 62,000 (Ghana Statistical Service, 2010). These areas share common climatic conditions; the equatorial zone with a rainfall regime typical of the moist semi-deciduous forest zone of Ghana. The communities are mostly rural. The residents are typically farmers and majority of the towns lack public healthcare facilities. The population is mainly of the Akan-speaking ethnic group of Ghana.

2.2. Data collection

Prior to data collection, informants' consent was sought by administering informed consent forms after explaining the purpose of the study to participants. The forms were filled and

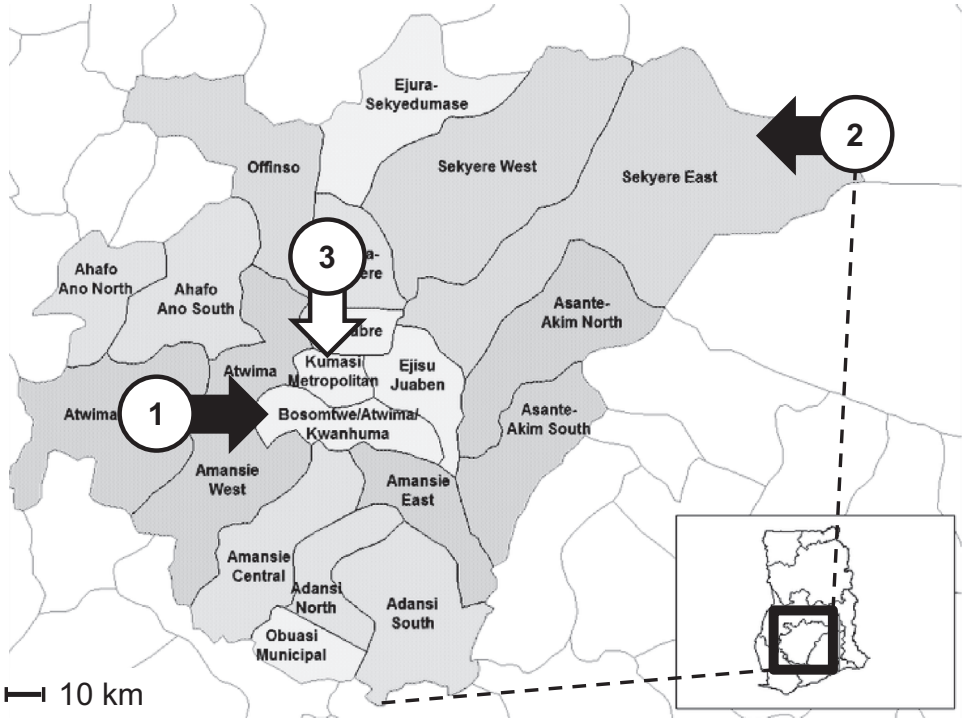

Fig. 1. District map of Ashanti region, Ghana, showing the study areas: (1) Bosomtwe and (2) Sekyere East Districts; (3) Kumasi Metropolitan Area. Source: Adapted from Wikimedia Creative commons.