A Community-wide Repellent Trial: Evaluating the Efficacy
and User-acceptance of a Low-cost Mosquito Repellent in Ghana

Interim Report

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October 2010
**Introduction**

Ghana suffers from some of the most intense malaria transmission in sub-Saharan Africa. In 2001, malaria accounted for almost 45% of all outpatient morbidity, 37% of hospital admissions and 13% of deaths (Global Fund, 2008). As part of the main malaria control strategy, Ghana has begun to implement a comprehensive array of anti-malarial interventions, including Artemisinin-based Combination Therapy (ACT), Intermittent Preventive Treatment (IPT), and Insecticide Treated Nets (ITNs). However, effort to achieve greater reductions in new infections from malaria might be significantly improved by incorporating an effective personal repellent in its Integrated Vector Management (IVM) strategies.

The repellent (NO MAS)- (NM) is a water-based formulation whose active ingredients are PMD (para-menthane-diol) and lemongrass oil. It has been tested in many countries and shown to provide as much as 99% protection for five hours against many species of mosquitoes. The current study is to evaluate the efficacy of NM against local anopheline vectors of malaria while simultaneously investigating how likely it is that rural Ghanaians would accept the use of NM as a routine malaria preventative measure.

**Aim:** To measure the efficacy, adverse effects and user acceptance of the ‘NO MAS’ repellent in Ghana

**Objectives**

1. To measure the percentage protection of the ‘NO MAS’ repellent on local inhabitants in Ghana
2. To measure the biting pressure of the mosquitoes
3. To measure the sporozoite rates of the mosquitoes
4. To measure the user acceptance rates of people using the repellent
5. To measure the malaria prevalence rates in communities with and without repellent
6. To measure the epidemiological efficacy of the ‘NO MAS’ repellent on local inhabitants

Activities

1. Efficacy study

A total of 4 mosquito collectors were recruited and trained on using the Latin Square design. Two households were selected in Korania community where the trial was done. A total of 16 days were used for the mosquito collection by the four (4) trained mosquito collectors (two Controls and two Treatments. The collectors sat from 9pm to 6am and rotated sequentially to a new position each night until the study was completed. On any given night, 2 of the collectors will use the NO MAS repellent (Treatment) whilst the other two will use 20% mineral oil in ethanol (Control).

The treatment group used an average of about 5ml of repellent on their bodies between the ankle and the knee and sat a minimum of 10 meters away from each other. The data is currently being analysed.

2. User acceptance study

At the beginning of the study, one-liter repellent containers were given to each participating household after the landlord has agreed to participate in the study by signing an inform consent form. All household members were shown how to use the repellent on themselves or on their children. Care was taken to select houses at least 30 meters between the houses of repellent users and non-users. A total of 77 landlords received 1 liter each of the NO MAS repellent. All the participants in the households who will use the repellent totaled 419. Repellents were first weighed before given to the landlords and basic demographic information on the landlord was obtained for future follow up on compliance and non compliance as the case may be. The questionnaire survey on user acceptance, replenishment of repellents, adverse effects and compliance is currently being carried on the participating households.
Preliminary results

Efficacy study

A total of 64 man-nights produced 576 *Anopheles* mosquitoes in the treatment arm and 5486 in the control arm giving percentage level of protection of 89.6% in the study area. This means that the NO MAS repellent provided almost 90% of protection against malaria vectors during 9 hours of capture. However during the peak time of biting (i.e. 00:00hours to 02:00hours), the NO MAS provided about 92% of protection. The average maximum and minimum temperature in the area in September was 31.2 and 22.8 °C respectively. The humidity in the area during the study was 80% (Meteorology Department in Ghana).

![Image of level of protection (%) of NO MAS in Ghana against Anopheles vectors of malaria]

User acceptance study

Preliminary survey of the user acceptance after 1 month usage of the NO MAS repellent showed that out of the 77 household heads who received the repellent and used with over 400 participants, all with the exception of 2 who did not respond said they will like to continue using the repellent giving a user acceptance rate of over 97% in the community.
Premilinary conclusion

The NO MAS repellent is efficacious against the two major vectors of *An. gambiae* and *An. funestus* in northern Ghana. This is observed even in relatively humid and high ambient temperature. With the relatively high user-acceptance rate of about 97%, the repellent will help in no small way to reduce malaria and lymphatic filariasis transmission since it is the same vectors that transmit both diseases in West Africa including Ghana.