Background and Rationale

Malaria resistant to nearly all drugs is again emerging in Southeast Asia, with WHO’s goal for elimination by 2020 (1) for the most dangerous strains. However, many challenges are being encountered (2,3). The goal of surveillance for malaria elimination is to capture every malaria case and execute a prompt and effective response (4). Here we describe the real world evaluation of an effective information system including the key components, rapid reporting, case investigation and response, to eliminate malaria as envisioned in a recent background paper (4).

Methods

Six communes in Phu Yen (PY) and Quang Tri (QT) Provinces (Figure 1) were selected for implementation of the system in 2015. Dong Xuan District, PY, was selected as the lead study area; the majority of data presented here are from PY. Approximately 4700 households were numbered with a unique identifier to link information. A smart phone with a cost < 150 USD, data collection application for smart phone (KLL collect; Figure 2) and online data server were down-selected for data capture and management. MapInfo Professional® was utilized for enhanced mapping (Figure 3). Seven data capture forms were developed and iteratively improved. In 2016, a household survey with a census of a 1015 households was added.

A 20% random sample of all households was conducted. In addition, a subset of the population had more information captured to better understand risk factors. Also in 2016, 67 cases were added for a total of 119 transmission sites visited.

Rapid reporting and initial case investigation was conducted at the six commune health centers where malaria cases were treated. For historical cases not captured at the health center, similar information was obtained at the patient’s household.

Full case investigation included a visit to the actual transmission location. Foci investigation and intervention response forms, both for people traveling to risk areas at the village level and in the forest were also developed. Weekly and monthly quality monitoring forms to ensure complete reporting, quality diagnosis and antimalarial drug accountability were pilot tested. National Malaria Control Program (NMCP) information added included LLIN distribution, net treatment, indoor residual spraying, use of directly observed therapy, and distribution of standby treatment.

Results and Discussion

Commune health staff were able to complete form 1 for 58 cases without difficulty. Weekly reporting was used successfully to ensure rapid reporting occurred; all cases were captured and feedback was provided to health staff as needed. The household survey of malaria patients identified risk groups, risk factors and additional cases for case investigation. Foci investigation forms were pilot tested in 20 households at the village level, showing interesting results with actual net use versus those captured in images (Figure 3). The monthly quality form proved potentially useful for monitoring case reporting, diagnostics quality and drug use. The 20% household survey sample will allow estimation of the actual population at risk and better define risk factors.

The transmission sites were determined for 144 cases representing approximately 13%, 95% and 82% of the cases from 2014, 2015 and 2016, respectively. These cases clearly distributed into areas to prioritize. Many of these sites were accessible in < 3 hours from village centers and the remainder of cases in areas <3 hours travel were monitored at three forest pathway points. Interviewees reported travel times were as follows: 35%, < 1h; 9%, 1-2h; 41%, >2-3h; 15%, > 3h.

At 119 transmission sites use of treated nets was low (Table 1). The sleeping structures were classified as houses (9%), huts with walls (24%), huts without walls 7%, and tarp or plastic covered structures (58%). The mean number of people at each sleeping site was 4.5. A mean of 1 hut (range 0-5) were reported within 500 meters of the index case’s site.

Conclusions

Despite very high household insecticide-treated net coverage, their use in risk areas appeared to be very low. Forest transmission sites are identifiable and targetable directly and/or at forest pathway points. The described transformative smartphone based information technology will facilitate rapid malaria elimination allowing near real-time monitoring to improve the quality and targeting of interventions. In an “enhanced malaria control study” NMPE staff are currently evaluating the same information system in the two highest priority areas in Vietnam.

References


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