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C. W. Mbuli, BSc, MA, E. Waqo, MBChB, MPH, National Malaria Control Programme, Ministry of Health, Nairobi, Kenya, P. O. Owiti, MBChB, MSc, Academic Model proving Access to Health care (AMPATH), Eldoret, Kenya, The International Union Against Tuberculosis and Lung Disease (The Union), Paris, France, H. Tweya, MSc, The International Union Against Tuberculosis and Lung Disease (The Union), Paris, France, The Lighthouse Trust, Lilongwe, Malawi, W. Kizito, BSc, MSc, Médecins Sans Frontières (MSF), Brussels, Belgium, J. K. Edwards, MD, MPH, Médecins Sans Frontières (MSF), Brussels, Belgium, Johns Hopkins University, Baltimore, Maryland, USA, K. C. Takarinda, BSc, MSc, The International Union Against Tuberculosis and Lung Disease (The Union), Paris, France, AIDS and TB Department, Ministry of Health and Child Care, Harare, Zimbabwe and Omondi-Ogutu, MBChB, MMed, PGDRM, Department of Obstetric and Gynaecology, College of Health Sciences, University of Nairobi, P.O. Box 19676 00202, Nairobi, Kenya

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C. W. MBULI, E. WAQO, P. O. OWITI, H. TWEYA, W. KIZITO, J. K. EDWARDS, K. C. TAKARINDA and OMONDI-OGUTU

ABSTRACT

***Background*: Kenya reports over six million malaria cases annually. In 2012 the country adopted the Test, Treat and Track (T_3) policy to ensure that all suspected malaria cases are tested, confirmed cases are treated with quality-assured drugs and timely accurate malaria surveillance are in place to guide policy and practice.**
***Objective*: To describe the trends of confirmed outpatient malaria cases and the consumption of artemisinin-based combination therapy (ACT) in the government health facilities in Kenya following the roll out of the T_3 initiative**
***Design*: A retrospective review study.**
***Setting*: All government health facilities in the 47 counties.**
***Subjects*: Secondary data on all outpatient malaria cases and ACT consumed as reported in the District Helth Information Software (DHIS).**
***Results*: Total malaria cases decreased from 8.5 to 6.8million cases in 2012 and 2015, respectively. Confirmed malaria cases increased from 1.97 (23%) to 4.9 (72%) million cases. The greatest decrease in total malaria cases and the greatest rise in confirmation of suspected cases occurred in the lower level health facilities. More confirmation of suspected cases occurred in the malaria endemic regions compared to other epidemiological zones. Excess ACT consumption reduced by 46% to reach 27% in 2015.**
***Conclusion*: Though there was increased confirmation of suspected malaria, still one-third of the outpatients were treated clinically in 2015. About one-third of ACTs were also used in excess in 2015. There is need for enhanced efforts to adhere to the T_3 policy and malaria elimination guidelines.**

INTRODUCTION

Despite huge investments made in Malaria prevention and control in the last decade, transmission still occurs in several countries (1,2). In 2015 the World Health Organisation (WHO) reported that Malaria caused an estimated 438,000 deaths globally, 67% of which were in children less than five years (3). However, scale up of interventions has resulted in some reduction in malaria burden even in the high transmission countries of sub-Saharan Africa (4).

Previously, malaria was mostly treated presumptively which led to overuse of anti-malarials, unaccountability of resources and unnecessary suffering especially where fever was associated with other infections. Understanding the real burden of the disease was equally a challenge. The paradigm shift from presumptive treatment of fevers and suspected malaria to universal parasitological confirmation prior to treatment with artemisinin-based combination therapy (ACT) became an internationally accepted malaria case-management standard in 2010 (5,6). By the end of 2011, about 93% of the WHO African region endemic countries had adopted this policy of parasitological diagnosis by either malaria microscopy or rapid diagnostic test (RDT) (4).

In order to support malaria-endemic countries in their efforts to achieve universal coverage with diagnostic testing, anti-malarial treatment and in strengthening their malaria surveillance systems,

the WHO Global Malaria Programme launched the Test, Treat, and Track (T_3) initiative in 2012 (4). Under this strategy countries are to ensure that all suspected cases are tested, all confirmed cases are treated with quality-assured drugs and timely and accurate malaria surveillance are in place to guide policy and practice (4).

Kenya is considered a malaria-endemic country with annual malaria cases estimated at 6.7million (7). Adopted in 2012 (8), the T_3 initiative was aimed at ensuring that malaria diagnostic testing was available across all levels of the health care system in order to improve the quality of care and ensure that anti-malarial medicines are used rationally and correctly (9). RDTs are mostly used at the lower levels of health care while microscopy in the higher levels due to its intense need for personnel and other resources (10).

Malaria Control in Kenya: The National Malaria Control Programme (NMCP) oversees implementation of all malaria activities in the country. NMCP has six sub-units that include vector control, Malaria case management, epidemic preparedness and response, advocacy, communication and social mobilisation, surveillance, monitoring and evaluation and operational research and the programme management (8). A patient presenting with suspected malaria should be offered a diagnostic test. A confirmation results into treatment with the ACT as an outpatient if uncomplicated malaria. However, if a case of severe malaria then treatment is offered as an inpatient with parental artesunate but in its absence quinine is administered (8). ACTs are part of the essential medicines and are administered free of charge in all government and public hospitals. If the blood test is negative, further investigations are to be carried out and appropriate management instituted.

There has been no formal evaluation of the impact of the T_3 initiative in the malaria control in the country. In this study, we describe the trends of reported outpatient malaria cases and the consumption of ACTs in the government health facilities in Kenya following the roll out of the initiative. The study findings will help inform the National Malaria Control Programme (NMCP) better implement the malaria strategy fully, ensure accountability and direct the available resources to where they are most needed.

MATERIALS AND METHODS

Study design: This was a retrospective review of routinely collected country-wide data from government health facilities in the 47 counties in Kenya.

Setting: Kenya, located on the eastern part of Africa, is divided administratively into 47 counties. In 2015 the country's population was estimated to be 46 million (11). The health care system in the country is divided into six levels: level one – community; level two – dispensaries; level three - health centers; level four - the primary/ first level hospitals (sub-county and county hospitals); level five - secondary/ second level hospitals that provide comprehensive services; and level six - tertiary hospitals which have specialised services (12). The country has four malaria epidemiological zones: Endemic, Seasonal, Epidemic prone and Low risk malaria areas. These zones are diverse in risk determined mainly by the altitude, rainfall patterns and temperature as well as the malaria prevalence (8, 10).

Data and analysis: NMCP uses a comprehensive disease surveillance system, the District Health Information System software (DHIS) to routinely collect and report outpatient malaria cases and consumption of ACTs. Malaria data is recorded daily in outpatient registers (13). These data are summarised on a monthly basis into summary forms and sent to the sub-county level for entry into the DHIS version 2 (DHIS2). Health records and information officers validate the data before entry in the DHIS2. The DHIS2 also has an in-built mechanism which validates the data as it is being entered. Data in the DHIS2 are available at all health levels for further decision making (8).

We extracted data for total malaria cases (clinical and confirmed) disaggregated by age, facility level, malaria epidemiological zone and ACT consumed from DHIS2 into MS Excel. Descriptive analysis has been performed with the data presented in tables and graphs. In addition, excess consumption of ACT was calculated by sub-tracting number of confirmed malaria cases from the number of ACT doses consumed and divided by the number of ACT consumed. Reporting rates were calculated by dividing the number of health facilities that reported by the number of that were expected to report in that period.

Ethics approval: Formal ethics approval was granted by the Institutional Research Ethics Committee (IREC) of Moi University/ Moi Teaching and Referral Hospital, Eldoret, Kenya and the Ethics Review Board of Médecins sans Frontières, Geneva, Switzerland. Informed consent was not necessary as we used aggregated data available at the Ministry of Health level. Permission was obtained from the Ministry of Health, Nairobi, Kenya.

RESULTS

The total outpatient malaria burden reduced by about half from 23% in 2012 to 12% in 2015. Between 2012 and 2015, of the 193.6 million outpatient cases, 31.1 million (16.5%) malaria cases were registered in Kenya (Table 1). Of these, 14 million (44%) were confirmed malaria cases. The cases of malaria among outpatients reduced from 8.5 million to 6.8 million, representing

a 19% decrease. In 2015, 72% of the total malaria in the outpatient were confirmed by a diagnostic test. This means that about 30% malaria cases were still treated clinically. There was an increase in facilities reporting malaria cases in the outpatient settings (reporting rates) over the study period from 89% to 95%. Although total malaria cases decreased in all types of health facilities, the decrease is greatest in dispensaries. Proportion of confirmed malaria cases increased in both the dispensaries and health centres (Figure 1).

Facility type: Dispensaries are levels 2; health centres are levels 3 and Hospitals are levels 4 and 5

Similar decline in total malaria were observed in the two age categories of children below five years (11% decline) and patients five years of age and above (9% decline) between 2012 and 2015. However, the confirmed malaria cases increased by about half in all ages (50% in <5years and 49% in ≥5 years).

Proportion of total malaria cases in the outpatient settings decreased in all epidemiological zones, with the greatest decrease in the endemic zones followed by seasonal (Figure 2a). The trends were not significant in highland epidemic and low risk zones. Although proportion of confirmed malaria cases increased in all the epidemiological zones, the increase was greatest in the endemic areas (Figure 2b).

Figure 4 shows the trend of excess consumption of ACTs over the study period. Dispensaries reported drastic reduction in the excess ACTs consumed over the years (by 63%), while the hospitals had the least decrease in excess ACTs consumed (21%). Excess ACT consumption reduced from 73% in 2012 to 27% in 2015. The ACTs reporting rates increased from 65% to 70%.

Table 1

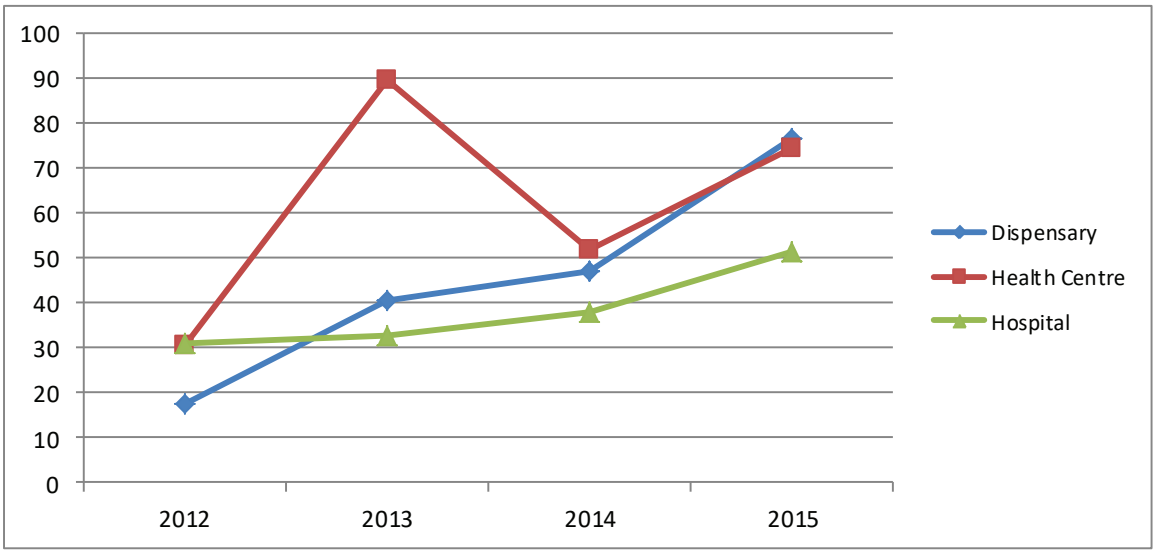
Outpatient malaria cases reported in Kenya from 2012 to 2015

Year	All outpatient cases	All malaria cases[a] N	(%)[b]	Confirmed malaria cases N	(%)[c]
2012	37,283,633	8,474,945	22.7	1,969,868	23.2
2013	44,445,618	7,871,171	17.7	3,185,007	40.5
2014	54,821,930	8,774,354	16.0	4,091,494	46.6
2015	57,141,568	6,852,506	12.0	4,922,574	71.8
Total	193,692,749	31,072,976	16.5	14,168,943	44.3

[a]All malaria cases = clinical and confirmed malaria cases; [b]proportion for all malaria cases = all malaria cases/ total outpatient cases; [c]proportion of confirmed cases = confirmed malaria cases/ all malaria cases. Although total malaria cases decreased in all types of health facilities, the decrease is greatest in dispensaries. Proportion of confirmed malaria cases increased in both dispensaries and health centres.(Figure)

Figure 1

Reported confirmed malaria cases in the outpatients in Kenya from 2012 to 2015 by facility type



Facility type: Dispenaries are levels 2; Health centres are level 3 and hospitals are level 4 and 5. Similar dicline in total malaria cases were observed in two age categories of children below five years (11% decline) and patients five years of age and above(9% decline) between 2012 and 2015. However, the confirmed malaria cases increased by about half in all ages (50% in < 5 years and 49%>+ 5 years).

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Figure 2a

Proportion of malaria cases stratified by epidemiological zones in Kenya, between 2012 and 2015

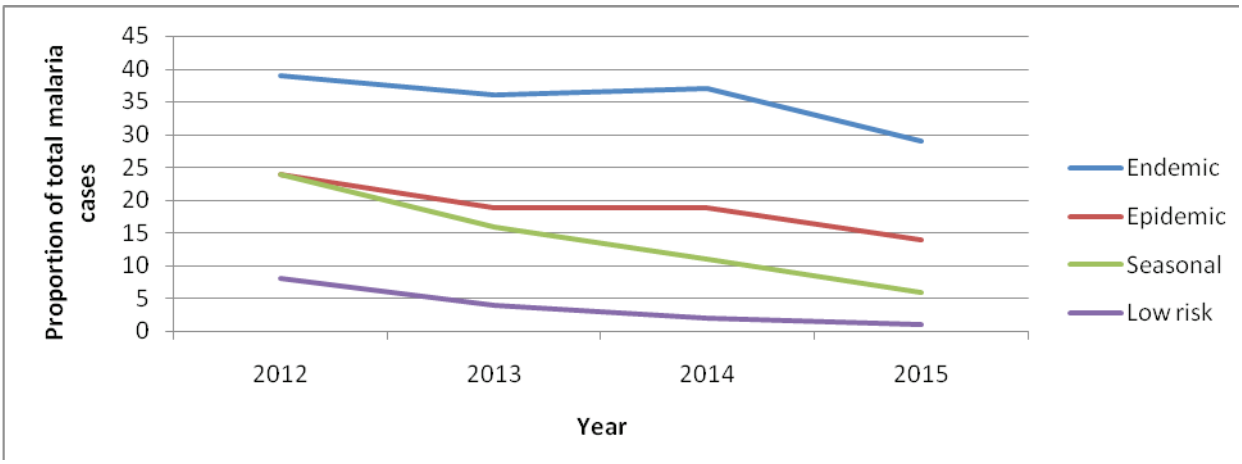
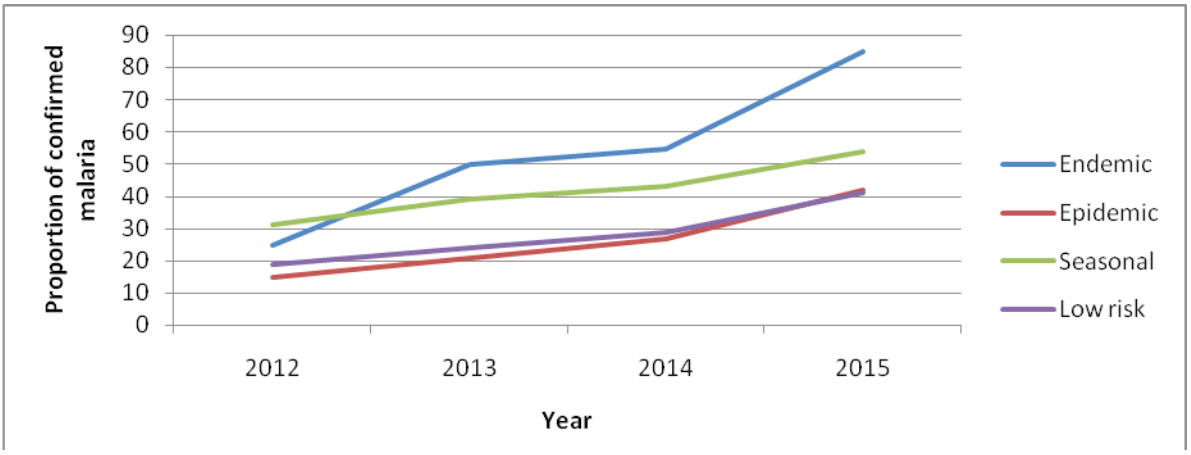


Figure 2b

Proportion of confirmed malaria cases stratified by epidemiological zones in Kenya, between 2012 and 2015



a: Proportion of total malaria cases = all malaria cases/ total outpatient cases; b: proportion of confirmed malaria = confirmed malaria cases/ all malaria cases.

Consumption of ACTs remained relatively the same in the study period but higher than confirmed malaria cases (Figure 3).

Figure 3
All artemisinin-based combination therapy (ACT) consumed compared to the confirmed malaria cases reported in Kenya from 2015 (in 10,000)

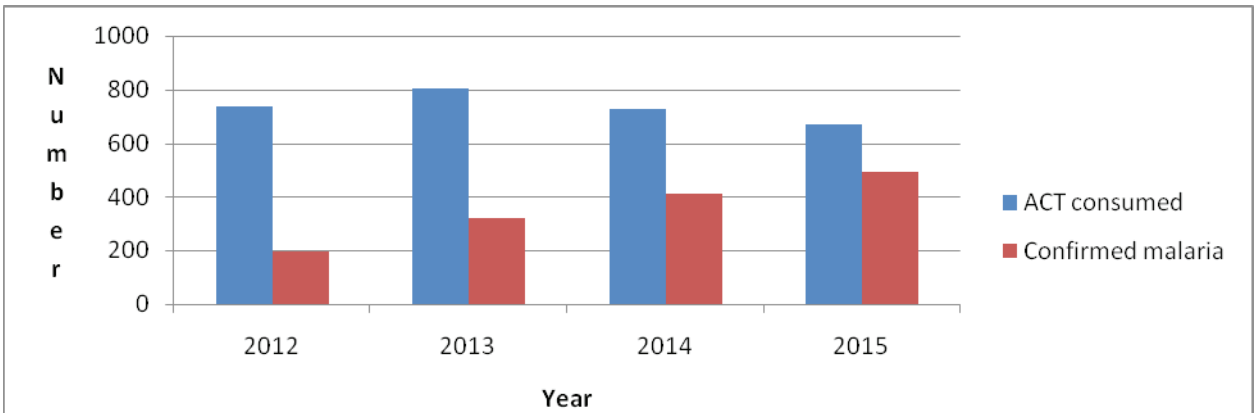


Figure 4
Trends of excess artemisinin-based combination therapy (ACT) consumed in Kenya from January 2012 to December 2015

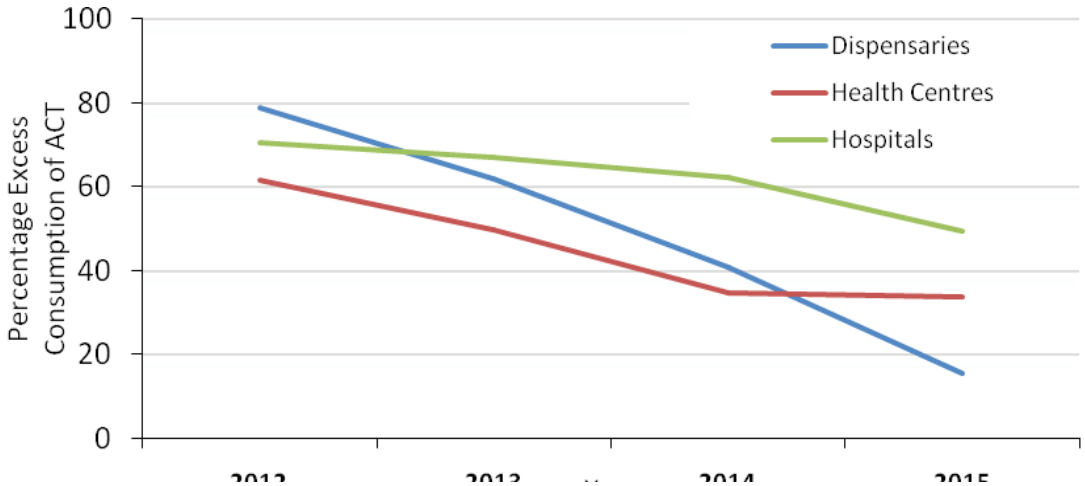


Figure 4 shows the trend of excess consumption of ACTs over the study period. Dispensaries reported drastic reduction in the excess ACTs consumption over the years(by 63%), while the hospitals had the least decrease with excess ACTs consumed(21%). Excess ACT consumption resuced from 73% in 2012 to 27% in 2015. The ACTs reporting rate increased from 65 to 70%.

Excess consumption of ACT was calculated by subtracting number of confirmed cases from the number of ACT doses consumed and divided by the number of ACT consumed.

DISCUSSION

This is among the first studies in the country that assessed malaria trends and ACT consumption in the whole government health sector over a period of four years. In this study, we note that malaria cases have been decreasing gradually over the period. In as much as confirmation of suspected malaria has increased, which conforms to WHO report 2014 (4), still one-third of the outpatient cases were treated clinically in 2015. The greatest decrease in malaria cases, and the greatest rise in confirmation of suspected cases occurred in the lower level health facilities that are primarily the target of the easy-to-use RDTs. More confirmation of suspected cases occurred in the malaria endemic regions compared to other epidemiological zones. Such differences were not noted, however, between those under and above five years of age. Despite the decrease in the excess ACT consumption, still one-third of the ACTs could not be accounted for in 2015.

A key strength of this study is that the data were obtained from the government health facilities in the country operating under routine conditions. It

is thus a reflection of the programmatic setting for the country. Except for the numbers of malaria cases reported for the health centres for the year 2013, the data is generally robust with no major missing data points noted. Facility reporting rates also improved over the period.

Though the WHO African region, including Kenya, has had the largest increase in testing of suspected malaria (from 41% in 2010 to 65% in 2014), this is still less than the 2014 global average of 78% and far less than the optimum – for example, the South-East Asian region reported 90% testing rate (14). Testing all suspected cases of malaria, followed by appropriate treatment with quality-assured drugs improves treatment outcomes. Treating clinically may enhance drug resistance and impact on morbidity and mortality especially if the fever was not due to malaria.

A factor influencing testing of suspected malaria cases is adequate supply of the test kits (RDTs or microscopy and related consumables) at all health levels. Though the African region still accounts for majority of the RDTs procured at international level (14), NMCPs must continue to ensure that temporal stock-outs due to the bureaucratic supply chains are handled. Provider compliance to guidelines also plays a major role in testing suspected cases and treatment of only test-positive cases. In this study, this may be alluded to by the excess ACTs consumed in comparison to confirmed malaria cases. Indeed a study by Kwarteng in Ghana found low level of provider compliance to testing and treatment guidelines even in the presence of adequate malaria diagnostics (2). Pre- and in-service trainings, continuous sensitisation and mentorship and routinisised supervision of health staff would need to be enhanced. Higher-level health facilities having more and specialised staffing and resources must not be omitted in these regards, as witnessed by the least rise in the confirmation of suspected malaria and least decline in excess unaccounted ACTs.

Uptake of RDTs and improved testing is a strategy for reducing malaria burden in a country. As such, and for a country like Kenya still reporting millions of cases annually, improved implementation of these guidelines remain key. However, to attain the country's goal of reducing malaria burden by two-third in 2018 (compared to 2007/2008 level), there is urgent need to intensify all other intervention strategies including the use of Long-Lasting Insecticidal-treated Nets (LLIN) and Indoor Residual Spraying (IRS). The country needs to aggressively push towards the next level in the continuum of malaria elimination.

Our study had several limitations: all cases of malaria occurring in those above five years of age have been lumped together, thus not allowing us to weed out any age-related differences; malaria among inpatients is not included; routine data is prone to some errors. However, DQA is occasionally conducted in selected facilities. We also do not report on the possible stock-out of RDTs which may have direct effect on testing.

In conclusion, this study shows increase of confirmation of suspected malaria cases over the study period with more confirmation occurring in the lower level health facilities and malaria endemic regions. However, one-third of the patients were still treated clinically with about one-third of ACTs being consumed in excess in 2015. Adherence to the T_3 Policy in the country, coupled with other intense malaria intervention strategies, need to be enhanced.

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