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Message from the Program Manager

I am pleased to welcome you to the 3rd edition of the Malaria Surveillance Bulletin from the Division of Malaria Control (DOMC). In this issue, we demonstrate the performance in key malaria indicators over the past quarter (October to December 2012) using data on six out of the nine surveillance core graphs. As a clear departure from the format of the second edition, data for outpatient confirmed malaria cases (Graph 1), test positivity rate (TPR) (Graph 2), and treatment with artemisinin-based combination therapy (ACT) (Graph 4) are now disaggregated according to the four epidemiological zones in Kenya. In addition, this edition includes a malaria vector map for Kenya as an effort to target discussions on malaria control in different regions.

There were several developments during the second quarter. First, a major development in vector control was reached following a policy change on the recommended insecticide for indoor residual spraying (IRS). The Ministry of Public Health & Sanitation recommended the use of carbamates for IRS in areas with perennial malaria transmission during the 2013/2014 spraying cycle. The change from pyrethroids to carbamates was made following results from recent studies on insecticide resistance showing high-level resistance against pyrethroid-based insecticides as opposed to organophosphate and carbamate-based insecticides. The studies were conducted in areas with high malaria transmission by the Kenya Medical Research Institutes. Importantly however, pyrethroid remains the insecticide of choice for treating nets due to its efficacy.

Secondly, the mass net distribution in the country was completed, resulting to the distribution of 10.6 million long lasting insecticide treated nets (LLINs) to all target areas in Nyanza, Western, Coast provinces and the epidemic prone districts in Rift Valley province (Trans Nzoia, Bomet, Kericho, Nandi, Uasin Gishu, West Pokot, Transmara and Loima). Evaluation results of the post-mass net distribution (phases 1 & 2) showed that 83.4% of the households in the lake endemic region, owned at least one LLINs, while 63.8% had more than one LLINs. On average households in this region owned 2.24. The Phase 3 evaluations will assess the LLIN coverage for coast province and the epidemic prone districts in the Rift valley province. The next mass net distribution is planned for in 2014.

Thirdly, the DOMC has embarked on rolling out rapid diagnostic test kits (RDTs) in the country in order to strengthen diagnosis and management of malaria, and in the context of implementing the 3T policy of testing, treating and tracking all suspected malaria cases. Since the RDT launch in October 2012, close to 3000 public health care workers have received a one-day RDT sensitization training, and 500 community health workers have been trained on community case management of malaria using RDTs. Currently, RDTs are supplied to all health facilities through Kenya Medical Supplies Agency. The main target is levels 1, 2, and 3 where microscopes and trained laboratory personnel are in short supply.

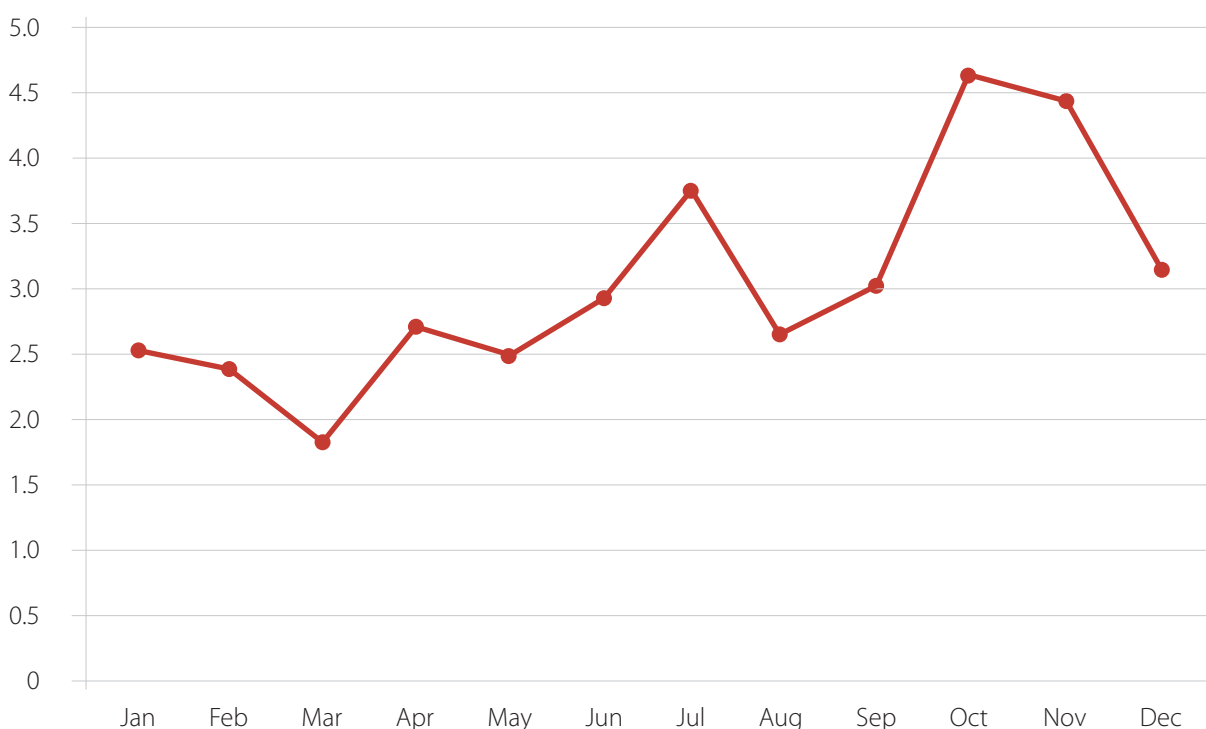
Lastly, continuous monitoring of malaria surveillance has been ongoing throughout the country and no malaria outbreaks associated with the short rainy season of October to December 2012 have been reported. Malaria surveillance activities in the epidemic prone districts (monitored by malaria case thresholds), insecticide-resistance monitoring and entomological surveillance in all IRS district are ongoing. Going forward, the DOMC is developing a malaria surveillance curriculum that will be rolled out countrywide. The curriculum is expected to strengthen malaria surveillance and malaria monitoring and evaluation systems in in all four malaria epidemiological zones in the country. Although malaria surveillance has mainly focused on the epidemic prone districts it is expected that with the roll out of a standard and uniform malaria surveillance training curriculum nationally, comprehensive malaria data will be available to inform the midterm review of the national malaria strategy and attendant work plan cycles.

Practice View

The 9 malaria core surveillance graphs are expected to help monitor malaria situation in the country based on the recommendation by WHO. We are using these graphs to illustrate performance in the key areas including the outpatient malaria TPR among children under five years, total inpatient malaria cases, the total inpatient malaria deaths in children under 5 years of age, the outpatient confirmed malaria cases and percentage of suspected malaria cases with a positive test, outpatient all-cause cases and suspected malaria cases among all ages, the percent of patients treated with ACTs, the number of antenatal care (ANC) clients receiving LLINs and intermittent preventive treatment for expectant (IPT2), the percentage of health facilities without stock outs, and those with stock outs of malaria commodities (i.e., ACTs, RDT, and LLINs) and the completeness of reporting and lastly, the percentage of health facilities and districts that report. In this issue, we present six of the possible 9 graphs including surveillance (3 graphs), logistics aspects (2 graphs) and reporting rates for each data source. The graphs are generated using routine data sources such as the Health Management Information System, division of diseases surveillance and response (DDSR) weekly data reports, and the Logistics Management Information System (LMIS).

OUTPATIENT CONFIRMED MALARIA CASES

Graph 1a: Number of Outpatient Confirmed Malaria Cases per 1,000



Sources: DDSR, HMIS, Census 2009

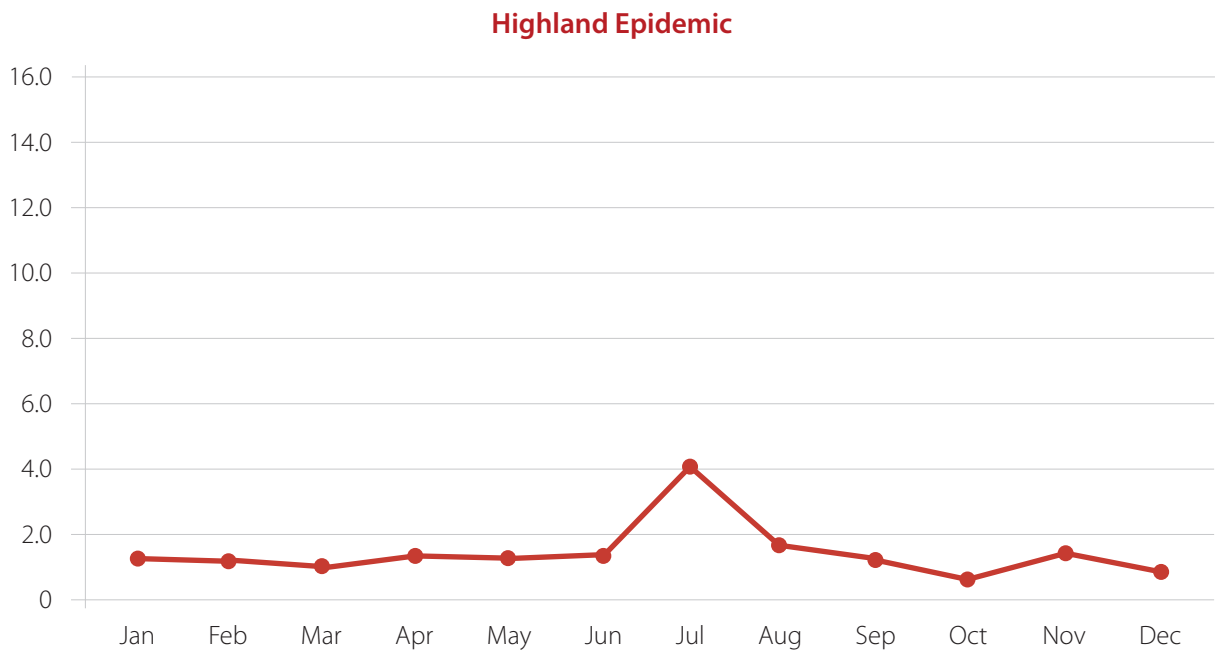
The period between May and July 2012 recorded an increase in the number of confirmed malaria cases coinciding with the long rainy season and from September to November 2012 coinciding with the short rainy season. Graph 1b shows the percentage of outpatient suspected malaria cases that are confirmed to have malaria by microscopy or RDT per 1000 people by the malaria epidemiological zones.

After disaggregation according to the epidemiological zones it is clear that the burden of confirmed malaria cases was highest in the endemic and seasonal malaria transmission zones (~4 confirmed cases per 1000 persons) with an upsurge in the month of July. The number of confirmed malaria cases in the western highland epidemic prone districts and in the low risk areas was below 2 cases per 1,000 persons.

Graph 1b: Outpatient Confirmed Malaria Cases per 1,000 of Population by Epidemiology Zones



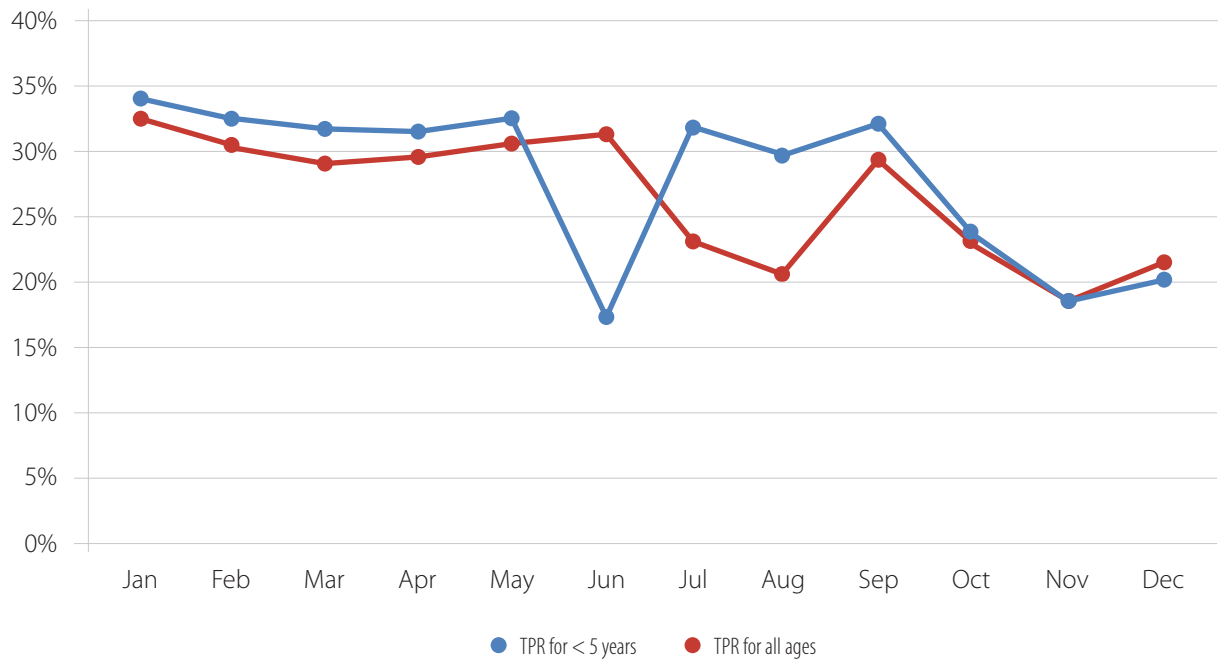
Graph 1b: Outpatient Confirmed Malaria Cases per 1,000 of Population by Epidemiology Zones
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OUTPATIENT TPR AMONG THOSE UNDER 5 YEARS AND ALL AGES

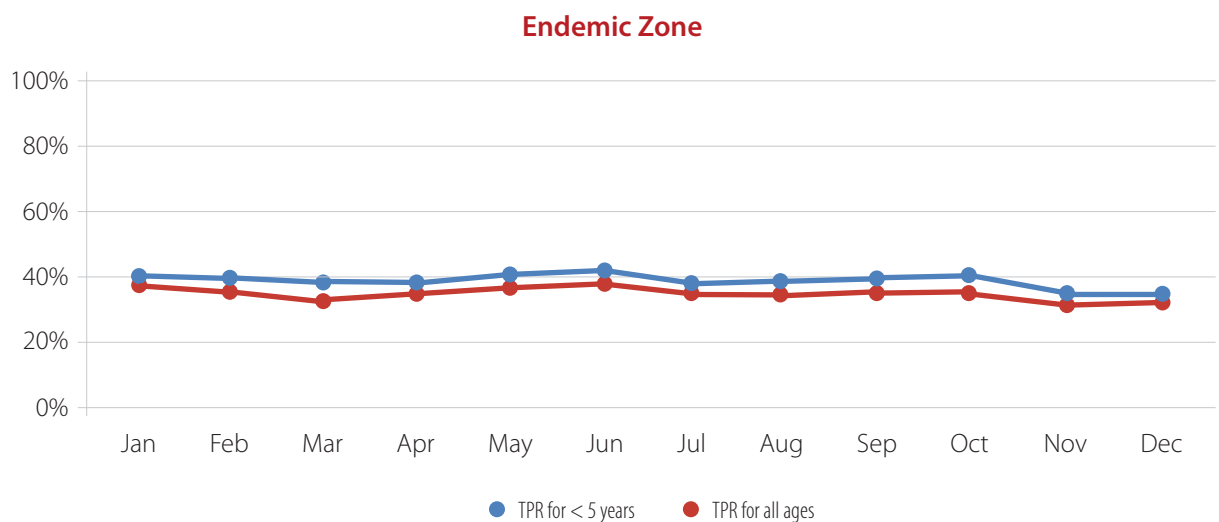
Graphs 2a and 2b presents the overall outpatient test positivity rates for the under 5 and all ages and by the malaria epidemiological zones in Kenya respectively. The graphs are based on data from the weekly reports by DDSR. These graphs demonstrate the trends with regard to the percentage of the malaria cases that tested positive against the total number of cases tested for malaria.

Graph 2a: Outpatient TPR for < 5 Years and All Ages Nationally

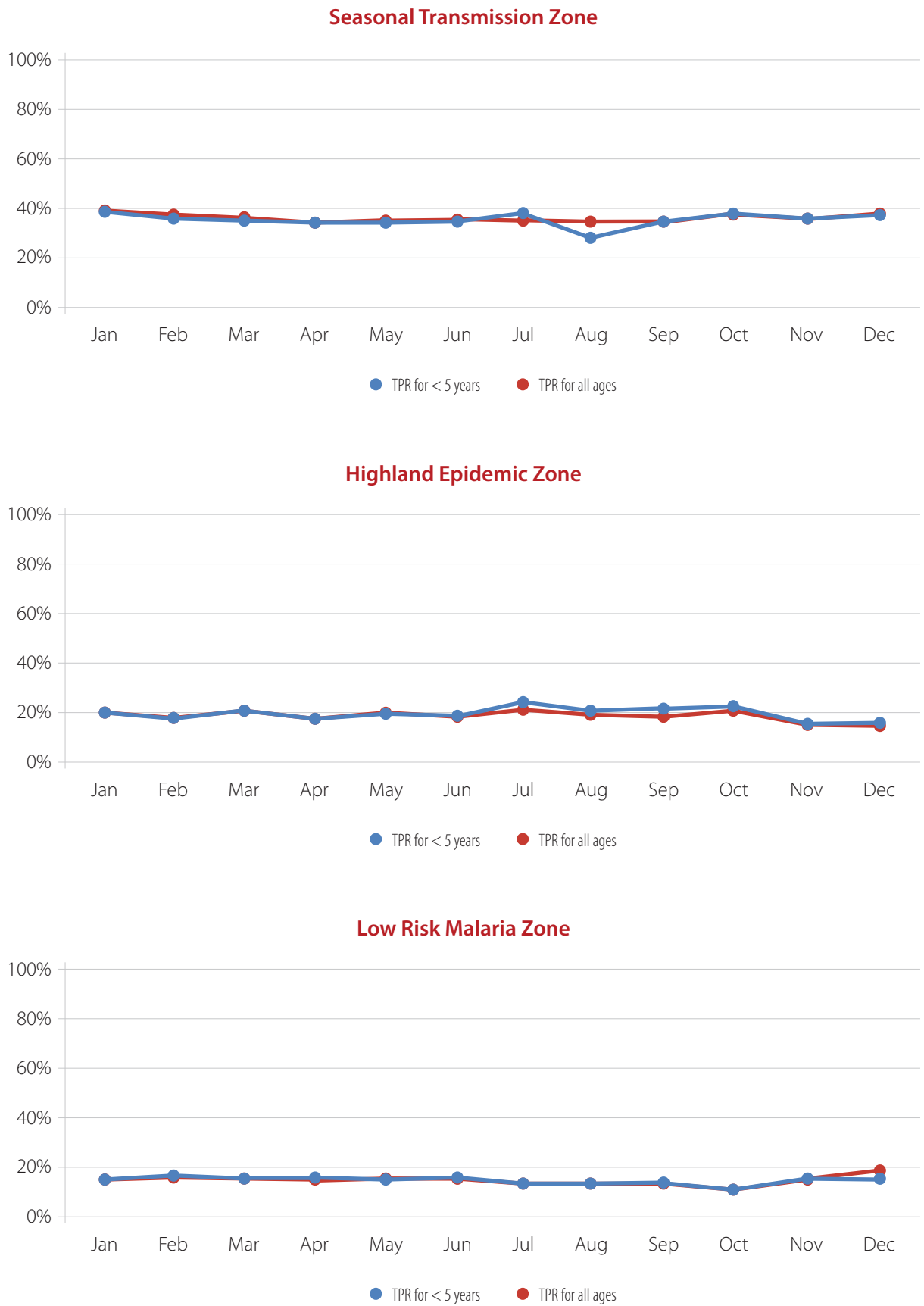


Graph 2b shows outpatient TPR disaggregated by different epidemiological zones. The TPR graphs for the malaria endemic and the seasonal malaria transmission zones showed a similar test positivity rate of about 40%, while the epidemic prone areas of the western highlands have a TPR of about 20% and the TPR for the low risk malaria zones stands slightly below 20%. These findings are unexpected, especially for the seasonal malaria transmission and the low risk zones, as these areas were expected to have a much lower TPR. This anomaly could be attributable in part to possible wrong interpretation of microscopy findings by laboratory technologists in those areas.

Graph 2b: Outpatient TPR for < 5 Years and All Ages by Malaria Epidemiology Zones



Graph 2b: Outpatient TPR for < 5 Years and All Ages by Malaria Epidemiology Zones *continued*

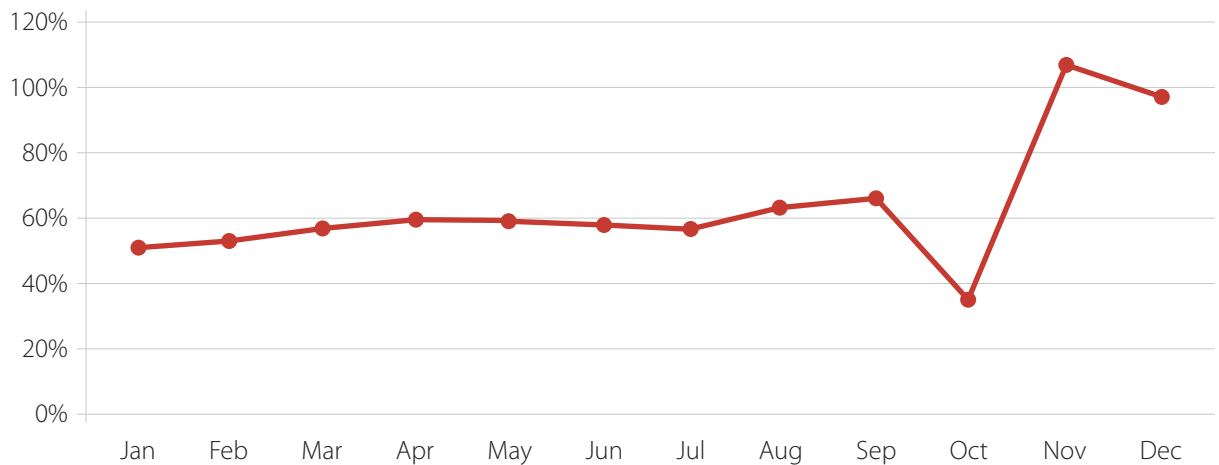


Source: DDSR

SUSPECTED MALARIA CASES TESTED WITH PARASITE-BASED TEST

The number of suspected malaria cases that were tested increased from ~60% to above 100% in November followed by a slight drop in December 2012. The rise is attributed to the launch and roll out of RDTs in October 2012. The percentage of suspected cases tested that was reported to be over 100% is probably the result of double counting of cases tested as facilities started using both RDTs and microscopy for diagnosis. Overall, this finding demonstrates that diagnostic capability of health facilities is steadily improving perhaps due to the availability of RDTs.

Graph 3: Suspected Malaria Cases Tested with Parasite-Based Test



Source: DDSR

PROPORTION OF CONFIRMED OUTPATIENTS MALARIA CASES TREATED WITH ACT

Graph 4: Confirmed Outpatients Malaria Cases Treated with ACTs



Sources: DDSR/LMIS/DHIS

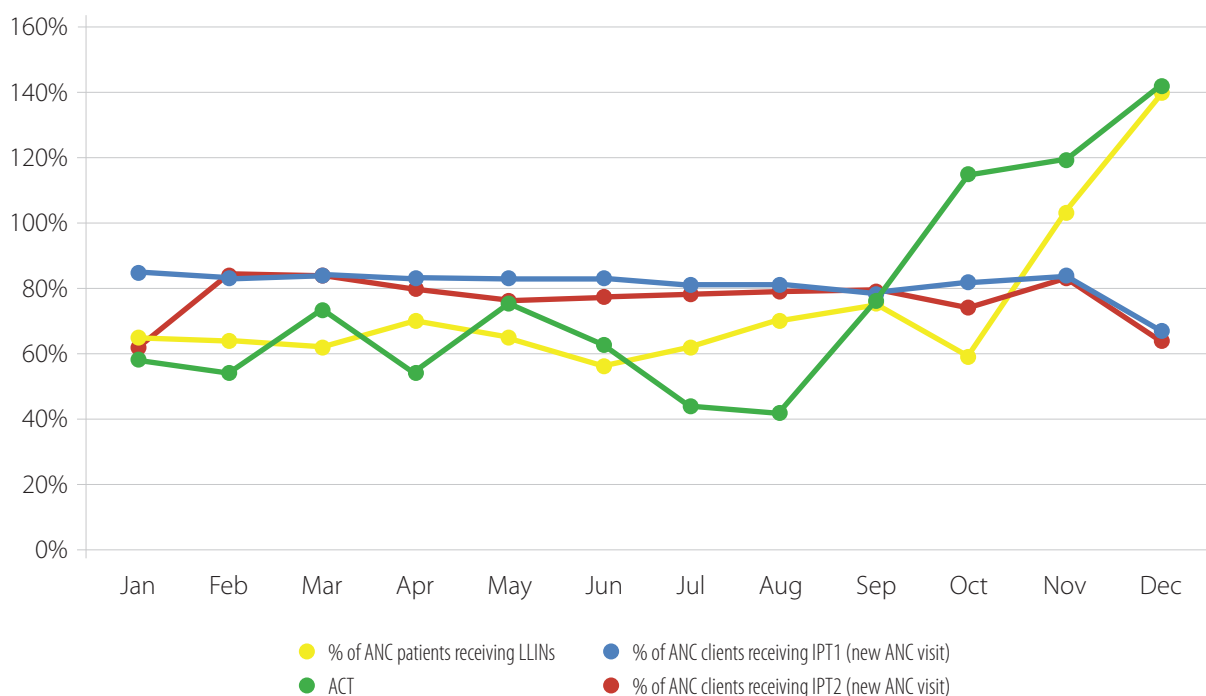
Graph 4 demonstrates the percentage of outpatient cases treated using ACTs over the reporting period. Kenya has adopted the policy of testing before treatment. However, ACTs should be administered to patients with a malaria positive result. The adherence of health facilities with this policy has previously been hampered by low coverage of RDTs or microscopy. According to Graph 4, there is a huge disparity between the percentage of confirmed malaria cases and ACTs consumed in the 2012 a pointer to continued non-adherence to treatment policy.

PERCENTAGE OF OUTPATIENTS TREATED WITH ACTS AND NUMBER OF LLINs DISTRIBUTED AT ANC

Prevention of malaria in pregnancy involves a combination of strategies aimed at reducing malaria related maternal and perinatal morbidity and mortality. The strategies include the ANC package that comprise at least two doses of sulfadoxine pyrimethamine for intermittent preventive treatment for expectant (IPT2), provision of LLINs and prompt diagnosis and treatment of fever.

In Graph 5 we present percentage of malaria cases among outpatients who received appropriate ACTs as per the national malaria treatment policy and the percentage ANC clients receiving IPT2 and LLINs. Clearly, the percentage of outpatients (tested positive) and treated with ACTs have increased to 140%. In addition, percentage of ANC mothers receiving LLINs between October and December 2012 increased from 60% to 140%. This sudden increase could be attributed to mothers who failed to get LLINs in October (when the country experienced stock out of LLINs). On the other hand, the percentage of ANC mothers receiving IPT2 (during 1st and more ANC visits) remained at 80% from January to November 2012, with a reduction to 65% observed in December.

Graph 5: Coverage of Outpatients Treated with ACTs and Clients Receiving LLINs and IPT2 during ANC Visits



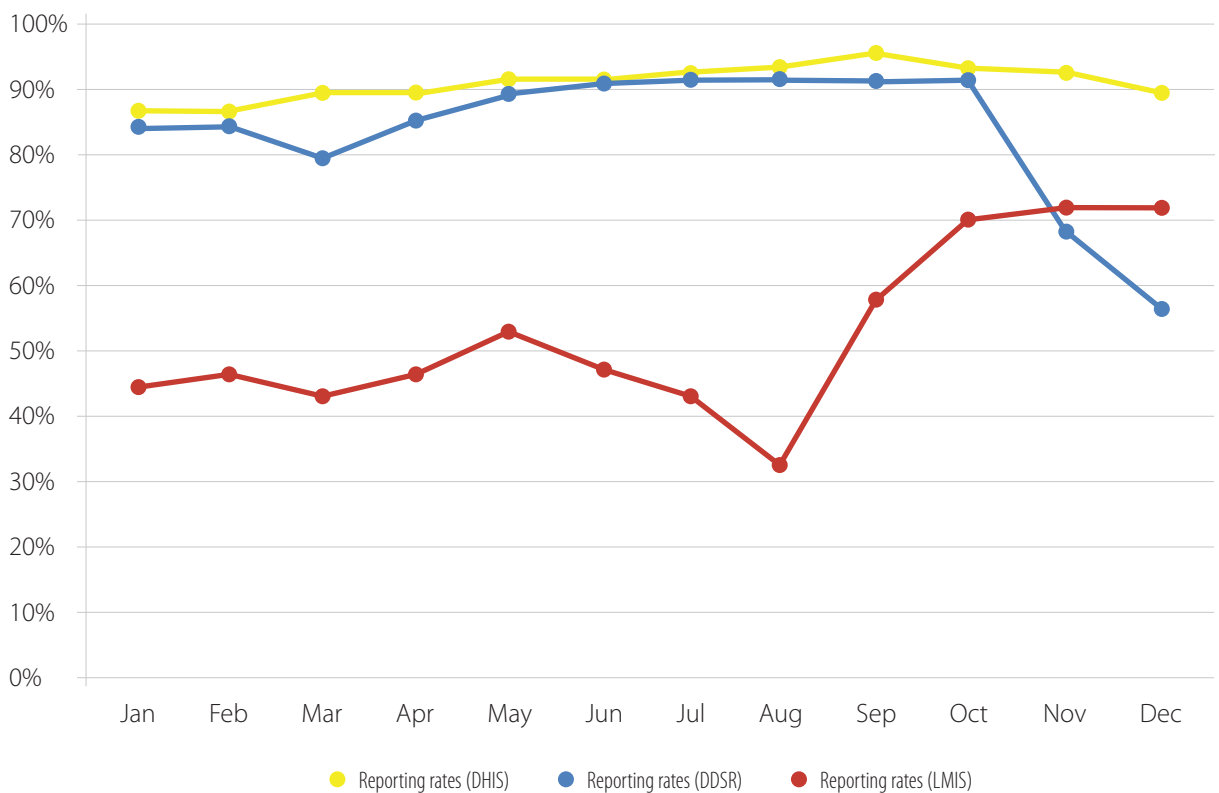
Source: DHIS/DDSR/LMIS

REPORTING RATES BY DATA SOURCES

The DOMC derives surveillance and monitoring and evaluation data from routine data reporting systems that includes the Division of Health Information Systems (DHIS), Integrated Disease Surveillance and Response (IDSR) and the LMIS. A reporting rate of 90% has been achieved for HIS. However, the reporting rates for LMIS has increased to slightly above 70% which is attributed to moving LMIS to DHIS and the support given to district pharmaceutical facilitators to upload malaria summary forms into the DHIS.

A drastic drop in the reporting rates for IDSR was recorded in November and December, due in parts to migration of IDSR to e-IDSR system that is ongoing.

Graph 6: Reporting Rates by Data Sources

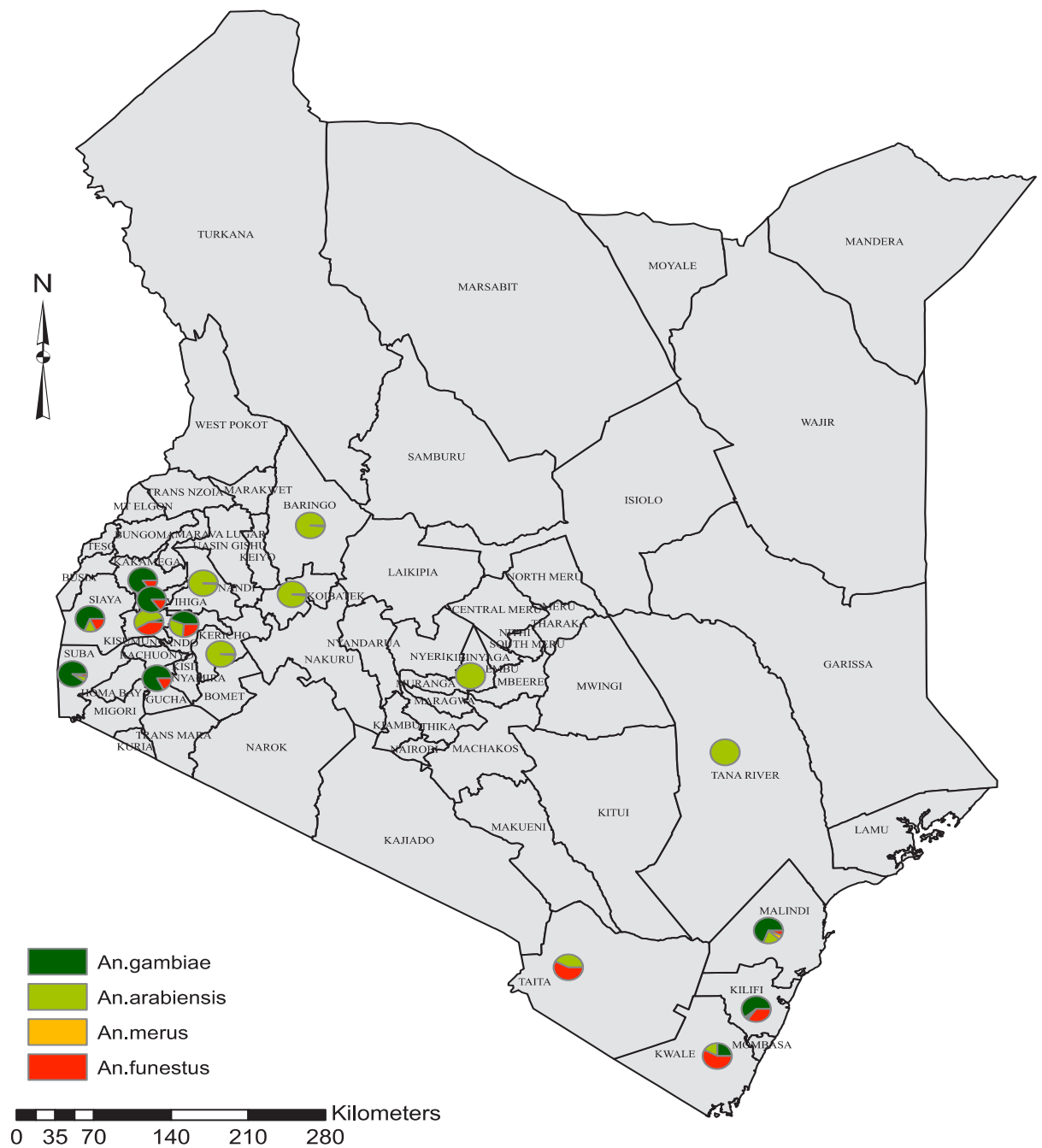


Source: DHIS/DDSR/LMIS

MALARIA VECTOR MAP

The malaria vector map shows that three major malaria vector species coexist in all parts of the country. However, *Anopheles gambiae* s.s. is more abundant in both the lake endemic and coast endemic regions. *Anopheles arabiensis* has a wider geographical distribution as compared with *Anopheles gambiae* s.s. and *Anopheles funestus*. This vector map is based on vector collections from small geographical areas that are adjacent to research institutes and is not necessarily representative of the entire country.

Malaria Vector Map by County



From the Counties

Table 1: General Overview of County Performance in Data Collection and Reporting for Selected Malaria Indicators

Province	County	No. malaria cases tested	No. of outpatient confirmed malaria cases	No. of outpatients treated for malaria	No. of LLINs distributed to pregnant women at ANC	No. of LLINs distributed to children under 5 years
Western	Bungoma	14,231	3,520	36,902	6,139	9,194
	Busia	53,131	18,436	28,912	3,336	3,647
	Kakamega	34,650	15,193	32,442	7,061	8,079
	Vihiga	53,144	17,949	11,137	1,946	2,483
Nyanza	Homa Bay	4,839	1,519	24,226	5,216	7,279
	Kisii	29,070	9,868	8,024	6,366	7,502
	Kisumu	25,652	2,206	26,772	4,124	5,878
	Migori	20,633	7,212	22,494	4,578	4,440
	Nyamira	12,512	4,349	1,275	3,107	5,526
	Siaya	9,650	257	34,663	4,851	6,712
Rift Valley	Baringo	53,655	22,537	5,733	2,634	3,205
	Bomet	7,503	1,938	1,895	3,875	4,295
	Elgeyo/Marakwet	6,296	398	1,890	1,566	2,529
	Kajiado	2,957	873	4,958	3,233	3,598
	Kericho	4,400	357	6,010	3,837	4,128
	Laikipia	10,979	1,114	1,578		
	Nakuru	5,598	1,176	22,578	134	99
	Nandi	26,859	8,502	5,618	2,576	3,196
	Narok	7,402	1,370	2,569	3,089	4,293
	Samburu	6,533	889	2,059	247	340
	Trans Nzoia	2,389	740	16,930	4,264	3,917
	Turkana	26,175	6,436	16,261	1,008	52
	UasinGishu	38,680	20,467	10,841	3,121	4,399
West Pokot	23,029	4,150	7,302	854	2,023	
Coast	Kilifi	4,194	26	17,701	5,455	4,521
	Kwale	16,082	2,333	10,932	3,649	2,055
	Lamu	14,309	3,474	611	1,078	162
	Mombasa	3,469	283	24,184	4,132	3,416
	TaitaTaveta	35,695	6,618	2,805	1,049	599
	Tana River	8,647	985	2,551	429	502
Eastern	Embu	4,047	609	14,954	1,533	2,034
	Isiolo	12,737	3,882	3,607	571	38
	Kitui	2,244	545	14,088	5,199	7,233
	Machakos	12,150	5,192	3,962	3,679	6,782
	Makueni	21,597	2,374	2,751	2,878	5,747
	Marsabit	16,471	1,753	842	186	
	Meru	2,782	220	56,238	3,937	6,672
	Tharaka-Nithi	50,372	20,140	14,436	1,573	2,244

Province	County	No. malaria cases tested	No. of outpatient confirmed malaria cases	No. of outpatients treated for malaria	No. of LLINs distributed to pregnant women at ANC	No. of LLINs distributed to children under 5 years
North Eastern	Garissa	33,572	5,655	2,098	632	883
	Mandera	8,510	743	904	212	
	Wajir	1,883	110	4,431	38	21
Central	Kiambu	2,163	453	4,674	3,071	2,309
	Kirinyaga	21,822	1,494	564	1,535	138
	Murang'a	2,899	55	438	2,750	5,364
	Nyandarua	2,021	22	2,832	178	
	Nyeri	2,896	181	157	63	70
Nairobi	Nairobi	16,971	6,428	14,583	827	253

Table 2: Malaria by Epidemiological Zones

Zones	Quarter	No. of cases < 5 years	No. tested < 5 years	Positive < 5 years	TPR for < 5 years	Total no. of cases	Total no. tested	Total no. positive	TPR for All Ages
Endemic	Qtr 3 11/12	4,686,851	177,361	70,187	40	10,931,874	453,263	161,531	36
	Qtr 4 11/12	5,656,846	230,018	90,885	40	13,125,350	577,644	209,464	36
	Qtr 1 12/13	6,487,270	263,741	102,626	39	15,629,470	688,235	244,302	35
	Qtr 2 12/13	2,742,910	135,215	48,687	36	6,679,667	353,189	115,011	33
Seasonal transmission	Qtr 3 11/12	2,011,880	88,202	32,357	37	5,665,111	272,837	103,414	38
	Qtr 4 11/12	2,158,643	99,410	34,324	35	6,228,514	322,125	113,471	35
	Qtr 1 12/13	2,509,285	129,078	41,543	32	7,209,170	409,759	143,458	35
	Qtr 2 12/13	914,374	54,622	20,019	37	2,765,362	173,913	64,153	37
Highland epidemic prone areas of western Kenya	Qtr 3 11/12	1,536,909	51,151	10,177	20	3,976,976	147,455	28,461	19
	Qtr 4 11/12	1,821,326	60,497	11,974	20	4,842,338	177,342	34,451	19
	Qtr 1 12/13	2,233,674	75,561	17,324	23	5,902,037	235,849	46,823	20
	Qtr 2 12/13	943,488	43,121	7,531	17	2,632,257	131,598	21,358	16
Low-risk malaria areas	Qtr 3 11/12	886,029	56,696	9,024	16	2,515,119	165,972	25,194	15
	Qtr 4 11/12	1,183,348	69,891	10,423	15	3,290,538	217,259	31,786	15
	Qtr 1 12/13	1,202,872	84,768	11,759	14	3,430,367	268,321	35,708	13
	Qtr 2 12/13	463,862	44,161	6,543	15	1,382,055	138,202	21,253	15

Table 3: Treatment by Epidemiological Zones

Endemicity	No. of suspected malaria cases	Aggregated patients on ACTs	% of outpatients treated with ACT
Endemic	1,032,494	670,727	154
Seasonal transmission	252,746	266,061	95
Highland epidemic prone	356,640	347,703	103
Low risk	136,679	166,386	82