MONITORING OUTPATIENT MALARIA CASE MANAGEMENT UNDER THE 2010 DIAGNOSTIC AND TREATMENT POLICY IN KENYA

Progress January 2010 – December 2018

Malaria Control Program

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FOREWORD

ACKNOWLEDGMENTS

We would like to thank all National Malaria Control Program personnel, the County Health Directors and the County Malaria Control Coordinators who participated in this project. We would also like to express our sincere gratitude and thanks to all data entry clerks, team supervisors, data collectors, health workers, patients and caretakers for their participation. We are grateful to the KEMRI-Wellcome Trust-University of Oxford Collaborative Programme for their technical support on this project through the longstanding collaboration with the National Malaria Control Program. Finally, this work would not be possible without funding support provided at various stages of the project by The Global Fund to Fight AIDS, Tuberculosis and Malaria, and U.S. President's Malaria Initiative through the *Afya Ugavi* project. We would like to extend our sincere thanks to all of them.

SUMMARY

Malaria case-management based on “test and treat” policy is the key component of the Kenya Malaria Strategy (KMS), the strategy launched in 2009, subsequently revised in 2014, and currently under the revision for another five-year period. The policy has been translated into national guidelines for health workers and specified that universal testing of all suspected malaria patients prior to the ACT treatment of only test positive patients with first-line drug for uncomplicated malaria, artemether-lumefantrine (AL), is the recommended outpatient standard for patients across all age groups and areas of malaria endemicity in Kenya. Since 2010, the National Malaria Control Program (NMCP), in collaboration with various partners, has been supporting translation of the recommended case-management guidelines into outpatient practice. Series of programmatic interventions have been implemented, including revisions and disseminations of malaria case-management guidelines for health workers, procurement of test and treat commodities, strengthening of the supply chain, regular in-service trainings for frontline health workers, strengthening of the supportive supervision and establishment of the quality assurance activities for parasitological malaria diagnosis, among others. Recognizing limitations of the routine logistics and health information systems to provide reliable health systems readiness and quality-of-care indicators, biannual health facility surveys have been implemented to monitor malaria related case-management prior to and following implementation of the 2010 case-management policy in Kenya. The first, baseline survey was undertaken in 2010 prior to the beginning of the “test and treat” implementation activities. Subsequently, 14 follow-up surveys were carried with the latest one in November-December 2018. In this report, we present the findings of the last survey, including the progress in the key health systems and case-management indicators for the period 2010-2018.

The range of randomly sampled health facilities across all survey rounds was between 169 and 176, interviewed health workers who saw outpatients on survey days between 190 and 237, and evaluated outpatient consultations for patients with fever between 566 and 2,408. During the last survey, 169 health facilities were assessed, 205 health workers interviewed and 643 febrile consultations evaluated of which 228 were for children below 5 years of age and 415 for older children and adults. Data collection during the latest survey took place between 26th November and 17st December 2018.

The latest survey found 75.7% of health facilities able to provide any type of parasitological malaria diagnosis on survey days. Despite increased RDT availability compared to the 2010 baseline, a major declining trend was observed compared to the previous 2018 round – the availability of RDTs at facilities

decreased from 65.3% to 50.9% while in consequence the proportion of facilities having capacity to provide at least one type of malaria diagnosis (RDT or microscopy) declined from 87.7% to 75.7%. The latest diagnostic capacity levels were also significantly lower compared to the optimum findings in 2015 when nearly all facilities (97.6%) could provide parasitological diagnosis and 90.5% of facilities stocked RDTs. Retrospective availability 3 months prior to the last survey reflected the findings on survey days and showed that 32.5% of facilities experienced absence of malaria diagnostic services between August and October 2018. During the last two rounds some positive trends were suggested in the coverage of facilities with quality control visits on malaria microscopy (25% to 31%) and RDT supervisory visits (21% to 27%), however the levels were significantly lower compared to the peak of these activities in 2015 (55% an 51% respectively). Rapid laboratory assessments found that 40% prepare both thick and thin smears, 90% use Giemsa solution, 50% report parasite counts as recommended by the guidelines while availability of SOPs for malaria parasitology ranged between 8 SOPs from 37% to 62%. About a third (35%) of laboratories participate in malaria EQA schemes and 56% of laboratory health workers attended an in-service training on malaria microscopy in past 3 years. Major differences in parasitological malaria capacities were observed with respect to malaria risk (lake and coastal endemic counties classified as “high” risk vs highland, seasonal, and low risk counties classified as “low” risk). Facilities in high malaria risk areas were more often able to provide parasitological diagnosis (95% vs 69%), stocked RDTs (72% vs 44%), participated in EQA scheme (47% vs 31%), performed thick and thin smears (53% vs 35%), used Giemsa solution (100% vs 87%), counted parasites per ml/WBC (74% vs 41%), had all SOPs for malaria parasitology (37% vs 13%) and laboratory workers trained on malaria microscopy in past 3 years (74% vs 49%).

Physical assessments on survey days found 84% of facilities stocking at least one AL pack and only 12% stocking all four packs. Notably paediatric AL 6 pack was available at only 23% of facilities. Retrospective stock-outs 3 months prior to the survey (Aug-Oct 2018) were the highest since the beginning of the monitoring period with 34% of facilities experiencing total AL stock-out and 83% stock-out of at least one AL pack. The most common AL pack out of stock in this period was AL 6 pack (77%) while the lowest levels of AL stock-outs were found for AL 24 pack (34%). Major differences in AL availability were observed with respect to malaria risk. While in high risk areas 98% of facilities stocked at least one AL pack and only 7% experienced total AL stock-out 3 months prior to the survey, in low risk areas the availability of AL on survey days was significantly lower (79%) and retrospective stock-outs were significantly higher (44%). The last survey also revealed that 52% of facilities had injectable Artesunate in stock, only 1% DHA-PPQ tablets and 88% of facilities had SP tablets in areas where IPTp policy is recommended. Finally, the last

survey found 55% of facilities with updated daily activity registers for malaria commodities during the previous month and 76% of facilities submitting monthly summary forms for 3 months prior to the survey.

The latest survey revealed 63% of health workers trained on malaria case-management. The coverage, in absence of the trainings during 2018, has been on decline since 2017 (69%). The exposure to malaria supportive supervisions increased compared to the previous survey (29% to 44%) however the coverage was significantly lower compared to 2015 (56%) when the highest coverage in malaria supervisions has been observed. The latest survey also found 52% of facilities having valid test and treat malaria guidelines, however only 24% having the latest edition and respectively only 31%, 17% and 37% of facilities having displayed charts on AL dispensing, diagnostic algorithms and artesunate administration. With respect to the health workers pre-referral knowledge, which was assessed during the last four rounds, no major improvements have been seen. The last survey showed that 63% of health workers knew about pre-referral artesunate treatment for children/non-pregnant adults and only 41% knew about artesunate treatment for pregnant women. The correct knowledge about artesunate dosing was 47% for children <20kg and 63% for patients >20kg. Health workers in high risk areas were more aware about pre-referral treatment policies compared to those in low malaria risk areas, both for children/non-pregnant adults (85% v 56%) and for pregnant women (53% vs 36%). Similarly, artesunate dosing knowledge was higher in high risk areas, both for children <20kg (79% vs 36%) and for patients over 20kg (91% vs 53%).

The composite “test and treat” case-management performance (defined as febrile patient tested for malaria and treated in accordance with test result) was 50.9% at the last survey, the level higher than at the baseline (15.7%) however on decline compared to the previous rounds (58.8% to 53.9% to 50.9%). The last survey found 53.3% of patients with fever tested, the levels higher compared to the baseline (23.9%) however also on decline compared to the previous rounds (64.3% to 58.6% to 53.3%). Both indicators were at the lowest levels of the performance since 2014. More positively, among malaria test positive patients, the last survey round revealed that AL was prescribed for 98.5% of patients, a significant increase compared to the baseline (82.7%). Similarly, among malaria test negative patients, the latest survey found only 6.7% of patients treated with antimalarial what represented a major 45.4% improvement compared to the baseline (52.1%) but also a decline in this non-recommended practice compared to the previous survey round (10.7%). Finally, only 5.3% of patients which are not tested for malaria were treated with an antimalarial, a major decrease compared to the baseline results (67.8%).

At facilities with malaria diagnostics and AL on survey days, health workers' levels of adherence to testing recommendations and subsequently overall case-management performance were higher throughout the monitoring period and significantly higher compared to the baseline findings. The results were however without significant changes in practices during the past rounds. At these facilities comparing respectively the results of the baseline and the last two surveys, the composite performance was 28.1%, 60.3% and 61.5%; testing rates 42.5%, 65.6% and 64.3%; AL treatment for test positive patients 83.3%, 96.9% and 98.4%; and antimalarial prescriptions for test negative patients 52.8%, 11.5% and 6.4%. The last survey also showed that when commodities are in stock, patients seen by health workers trained on malaria case-management were more commonly tested (68.2% vs 55.4%) and less commonly prescribed antimalarial for test negative results (2.8% vs 7.8%). The major differences during the last survey were however observed with respect to testing practices in relation to malaria risk. Compared to low risk areas, febrile patents in high malaria risk areas were more commonly tested for malaria (86% vs 46%) and more commonly managed in accordance with malaria guidelines (83% vs 43%).

The latest survey confirmed high levels (91%) of AL prescribing in accordance with weight specific dose recommendations while of 7 AL dispensing and counseling tasks assessed, the practice improvements compared to the baseline were observed for 5 tasks, specifically for patients weighing (+25%; 52% to 77%), administration of the first AL dose at facility (+13%; 32% to 45%), advising on the second dose after 8 hrs (+14%; 76% to 90%), advising to take AL after meal (+15%, 67% to 82%), and provision of advice to complete all AL doses (+8%, 80% to 88%). While at the latest survey 5 of 7 tasks were performed for more than three-quarters of AL treated patients, no improvements compared to the previous round were observed in any of the tasks performed. In contrast, a declining trend in the performance of the most important task - administration of the first AL dose at the facility - has continued over the past 3 rounds (72% to 63% to 45%). Finally, patients in high risk areas were more commonly administered first AL dose at facility (52% vs 26%), weighed before treatment (82% vs 66%) and advised to take the second AL dose after 8 hours (97% vs 71%).

In conclusion, the findings of fifteen survey rounds between 2010 and 2018 revealed that most of the key health systems and case-management indicators around "test and treat" policy for malaria have shown improvements compared to the baseline 2010 results. We have however observed negative trends during the recent rounds with respect to the availability of malaria diagnostics, artemether-lumefantrine, and case-management practices of which declining testing rates and administration of the first AL dose at the

facility are of major concern. More positively, the health systems readiness and adherence to guidelines is relatively high in high malaria risk areas. However, the major readiness and practice gaps observed in low risk areas severely compromise aspirations towards universal case-management targets. To bridge these gaps, the current and future programmatic activities should focus on:

- Further investigations and resolution of RDT, AL (especially paediatric packs) and artesunate stock-outs in low malaria risk areas and maintenance of the supply chain across the country.
- Implementation of the second line treatment policy for malaria according to guidelines.
- Targeted in-service case-management trainings for front-line health workers across the country.
- Scale up of in-service trainings on malaria microscopy for laboratory workers and inclusion of laboratories into EQA schemes across the country and especially in low risk areas.
- Quantitative increase in the county level supportive supervision and qualitative improvements to include malaria case-management activities, consultation observations, and RDT use supervision.
- Distributions of the latest editions of guidelines and job-aids for health workers through in-service trainings, supervisory visits and commodity distributions.
- Supervision of the facility health workers to improve quality of the routine recording and reporting for malaria commodities.
- Across the country, and with special focus on low malaria risk areas, in-service case-management trainings and supervisory visits should emphasize and reinforce that: 1) all patients with febrile illness should be tested for malaria; 2) the first AL dose should be administered at facilities under the observation; 3) patients should be advised to return for replacement dose to complete full treatment course in case of vomiting; 4) IM artesunate is recommended pre-referral treatment for severe malaria patients including pregnant women and 5) artesunate dosing schedule for children <20kg has been updated from 2.4 mg/kg to 3mg/kg.
- Across the country, and with special focus on low malaria risk areas, in-service trainings and quality control visits of laboratory personnel should emphasize the following malaria microscopy practice: 1) both thick and thin smears should be routinely prepared for malaria microscopy; 2) staining of blood smears using Giemsa solution and not Field stain; 3) parasite counts reporting based on counts per ml/WBC and not semi-quantitatively; and 4) all laboratories should have approved SOPs for malaria parasitology according to the guidelines.
- Biannual monitoring of the health systems readiness and the quality of outpatient malaria case-management should continue alongside implementation of the new Kenya Malaria Strategy.

1. BACKGROUND

Malaria case-management based on "test and treat" policy is the key component of the Kenya Malaria Strategy (KMS), the strategy launched in 2009, subsequently revised in 2014, and currently under the revision for another five-year period. The policy has been translated into national guidelines for health workers and specified that universal testing of all suspected malaria patients prior to ACT treatment of only test positive patients with first-line drug for uncomplicated malaria, artemether-lumefantrine (AL), is the recommended outpatient standard for patients across all age groups and in areas of malaria endemicity in Kenya [MOH 2010; 2012; 2014; 2016]. Since 2010, the National Malaria Control Program (NMCP), in collaboration with various partners, has been supporting translation of the recommended case-management policies into outpatient practice. Series of programmatic interventions have been implemented, including revisions and disseminations of malaria case-management guidelines, procurement of test and treat commodities, strengthening of the supply chain, regular in-service trainings for frontline health workers, strengthening of the supportive supervision and establishment of the quality assurance activities for parasitological malaria diagnosis, among others. Alongside the KMS, the national Monitoring and Evaluation Plan has been developed and it has specified optimistic targets of 100% of facilities continuously stocking ACTs and having malaria diagnostic capacities and 100% of suspected malaria cases who present to health workers to receive parasitological diagnosis and recommended treatment [MOPHS 2009b; MoH 2014b].

To monitor progress of the policy implementation towards national targets, the information about health facility and health worker readiness about case-management, and the quality of outpatient malaria management in accordance with national guidelines, is needed. Recognizing limitations of the routine logistics and health information systems to provide reliable levels and trends of the health systems readiness and quality-of-care indicators, innovative approach using biannual health facility surveys has been implemented to monitor malaria related performance prior to and following implementation of the 2010 case-management policy in Kenya. Moreover, beside the monitoring of the programmatic implementation under the 2009-2018 KMS, the data generated through the facility surveys have been used to provide information and support indicators for NMCP's GF performance rating, PMI's impact evaluation, malaria program reviews including feeding of the survey results into in-service trainings for health workers, supportive supervision and drug management activities, among others. By the end of 2018, 15 health facility surveys have been undertaken, the baseline in January/February 2010 prior to the beginning of the "test and treat" implementation activities and subsequently 14 follow-up surveys of

which the latest one was undertaken in November-December 2018. In this report, the findings of the latest survey including the progress made in the key national M&E health systems and case-management indicators for the period 2010-2018, are presented.

2. OBJECTIVES

2.1. General objective

- To monitor progress in achieving KMS targets with malaria related health systems support activities and the quality of outpatient malaria case management practices at public health facilities in Kenya.

2.2. Specific objectives

- To determine national levels and trends in the availability of malaria diagnostics, antimalarials, and other malaria related health systems support activities at public health facilities.
- To determine national levels and trends in health workers' adherence to outpatient guidelines for malaria diagnosis, treatment, counseling, and drug dispensing at public health facilities.

3. METHODS

Cross-sectional health facility surveys, measuring national levels and trends in the coverage of health facilities and health workers with malaria related health systems support activities and the quality of outpatient malaria case-management in accordance with national guidelines, were undertaken. All methodological details were provided in the previous reports (Memusi et al. 2010; Nyandigisi et al. 2011; Zurovac et al. 2014) while in this report the methods are summarized and minor modifications applied during the specific rounds are listed. Briefly, the selection of indicators was based on three major considerations: 1) those specified in the national Malaria M&E Plan 2009–2018; 2) those representing main health systems and clinical practice deficiencies reported in Kenya and which severely compromise the success of the malaria case management policy, and 3) those based on data elements that are relatively simple to collect over short period of time by the NMCP using rapid quality-of-care methods such as facility assessments, health worker interviews and outpatient exit interviews. With respect to the sampling of facilities, the national representativeness was assured drawing a stratified random sample of the public health facilities. The same sampling methods were applied during all survey rounds with an exception of the following two modifications applied from the seventh survey round onwards. First, due to the devolution process in the country, the national representativeness of the facilities was ensured

taking into consideration sampling fraction of the facilities based on the county boundaries instead of previously used provinces. Second, the surveys from the seventh round included facilities from the counties in the previous North Eastern Province (previously not assessed due to security reasons) and in Nairobi Province. The same methods of data collection were also followed. Prior to the surveys, the training of data collectors with concordance testing was undertaken in Nairobi. To optimize quality of data collection, the trainings have been preserving about two thirds of data collectors having experience from the previous survey round. The training for the last survey round was held in Nairobi from the 20th to 23rd November 2018. Thereafter the field work was conducted with twelve teams, each composed of three surveyors. At each of the survey facilities data were collected over one survey day. Each team was allocated one of 12 geographic areas countrywide and up to 15 health facilities per team what in turn resulted in completion of the entire data collection within three weeks or by 17th December 2018.

During the field work the survey teams arrived at the facility before the official opening time and stayed until the official closing time or until the time when the night shift would take over duties in facilities opened 24 hours. During the survey day at the health facility three methods of data collection were used. First, all sick patients presenting to the outpatient departments underwent rapid screening when they were ready to leave the facility. All non-referred and non-pregnant febrile patients presenting for an initial visit and weighing ≥5kg proceeded with interviews during which information was collected about main patients' characteristics, diagnostics requested, results reported and medications prescribed and dispensed. Second, each facility was assessed to determine the survey day and 3-month retrospective availability of medicines, RDTs, malaria microscopy as well as the support tools such as weighing scales, guidelines, job-aids and medicine inventory materials. During the last three survey rounds facility assessments also included rapid assessment of laboratories providing malaria microscopy to establish basic malaria microscopy practices and exposure to the quality assurance activities. Finally, all health workers who saw outpatients on the survey day were interviewed about their demographics, pre-service training, access to guidelines, and retrospective exposure to in-service training and supervision. During the last four rounds health workers' knowledge about prereferral treatment policy and artesunate use for severe malaria was also assessed using self-administered questions. All participating patients (or their caregivers) and health workers provided written informed consent.

Data entry and management was undertaken using Access and data entry during the last two rounds was undertaken by data entry clerks accompanying survey teams in the field. Paper questionnaires have been

kept for back up and data cleaning. The analysis was performed using STATA, version 11. The analytical approach reflected the main objective of the study, i.e. to provide national level results however during the last survey exploratory analyses stratified by malaria risk (lake and coastal endemic counties classified as “high” risk vs highland, seasonal, and low risk counties classified as “low” risk) were also undertaken on several key indicators.

4. RESULTS

4.1. Study populations

The latest outpatient survey carried out in November-December 2018 was the 14th follow up survey after the baseline undertaken in January-February 2010 prior to the beginning of the test and treat policy implementation for malaria. Between 2010 and 2018 a total of 15 monitoring outpatient surveys have been performed. The last survey included assessments of 169 health facilities, interviews with 205 outpatient health workers and evaluation of 643 consultations for febrile outpatients of which 228 were for children below 5 years of age and 415 for patients 5 years and older. With respect to the level of care and ownership of the facilities, the sample included 109 (65%) dispensaries, 36 (21%) health centres and 24 (14%) hospitals while 136 (81%) and 33 (19%) were respectively owned by the MoH and FBO/NGO sector. Of all surveyed facilities, 43 (25.4%) were in high malaria risk counties. The timings of all surveys with numbers of assessed facilities, interviewed health workers and evaluated outpatient consultations for patients with fever at all facilities and at the facilities with available test and treat commodities for malaria are shown for each survey round in Table 1.

Table 1: Number of assessed health facilities, interviewed health workers and evaluated outpatient consultations for febrile patients at all facilities and facilities with commodities in stock, by survey round

Survey	HFs assessed	HWs interviewed	Outpatient consultations at all HFs		Outpatient consultations at HFs with diagnostics and AL in stock	
			<5 years	≥5 years	<5 years	≥5 years
Baseline (Jan-Feb 2010)	174	224	1,070	1,335	591	648
Follow-up 1 (Nov-Dec 2010)	176	237	675	781	420	441
Follow-up 2 (July-Aug 2011)	174	233	535	673	301	333
Follow-up 3 (Mar-Apr 2012)	172	220	581	710	340	428
Follow-up 4 (November 2012)	172	216	510	735	383	536
Follow-up 5 (June 2013)	172	227	592	839	549	753
Follow-up 6 (February 2014)	172	211	551	667	349	422
Follow-up 7 (September 2014)	172	211	394	594	299	463
Follow-up 8 (April-May 2015)	169	203	379	477	336	435
Follow-up 9 (Nov-Dec 2015)	172	227	319	375	289	340
Follow-up 10 (June - July 2016)	172	224	313	531	234	440
Follow-up 11 (February 2017)	174	224	299	452	232	382
Follow-up 12 (September 2017)	170	190	203	363	184	316
Follow-up 13 (May 2018)	170	214	322	508	251	455
Follow-up 14 (Nov-Dec 2018)	169	205	228	415	174	314

4.2. Health systems support

This section shows levels and trends of the health systems coverage indicators referring to the facility and health worker characteristics important for the programmatic monitoring and performance of the test and treat malaria case-management policy.

4.2.1. Availability of malaria diagnostics and basic equipment

The latest survey found three-quarters (75.7%) of facilities providing at least one type of parasitological malaria diagnosis (either microscopy or having non-expired RDTs in stock) - a significantly lower capacity compared to the previous 2018 round (87.7%) and generally at the lowest levels of the facility coverage since 2014 (Table 2 and Figure 1). The decline in parasitological malaria capacities was mainly due to the continuing decrease in the availability of RDTs which was observed since 2014 and resulted in only half (50.9%) of the facilities stocking RDTs during the latest round. Low availability of RDTs was found at the hospitals (37.5%) and health centres (38.9%), where this may have been expected due to the higher presence of microscopy services (respectively 91.7% and 63.9%,) but also at level 2 facilities where only 57.8% of dispensaries had RDTs in stock. Similarly, the same proportion (57.8%) of facilities stocked RDTs at facilities where malaria microscopy was not available during the survey days. In contrast to malaria microscopy which was more common at the FBO/NGO (81.8%) compared the MoH facilities (33.1%) no significant differences in RDT availability were observed between MoH and FBO/NGO sectors (51.5% vs 48.5%). Subsequently, higher capacities of FBO/NGO facilities to provide malaria microscopy resulted in higher overall capacities for parasitological diagnosis at these facilities compared to those owned by the MoH (90.9% vs 72.1%). Finally, as similarly observed during the previous rounds, the last survey found nearly all facilities (98.2%) having at least one weighing scale while as high as 92.9% of facilities had at least one functional thermometer.

Table 2: Availability of malaria diagnostics

	Base N=174 (%)	FU 1 N=176 (%)	FU 2 N=174 (%)	FU 3 N=172 (%)	FU 4 N=172 (%)	FU 5 N=172 (%)	FU 6 N=172 (%)	FU 7 N=172 (%)	FU 8 N=169 (%)	FU 9 N=172 (%)	FU 10 N=172 (%)	FU 11 N=174 (%)	FU 12 N=170 (%)	FU 13 N=170 (%)	FU 14 N=169 (%)	% diff FU 13 vs FU14	% diff B vs FU14
Availability of diagnostics																	
Non-expired RDTs	7.5	8.5	12.6	16.9	31.4	69.8	40.1	68.6	90.5	84.3	71.5	59.2	71.8	65.3	**50.9**	**-14.4**	**+43.4**
Malaria microscopy	50.6	53.4	54.0	53.5	56.4	51.2	47.1	48.8	44.4	43.9	45.4	48.9	52.9	43.0	**42.6**	**-0.4**	**-8.0**
Any malaria diagnostics	55.2	58.0	58.6	65.1	75.6	90.7	77.3	91.3	97.6	96.5	93.0	83.9	93.5	87.7	**75.7**	**-12.0**	**+20.5**
Expired RDTs	3.5	0.6	1.2	0.0	2.9	2.9	4.1	4.1	6.6	4.1	4.1	5.2	4.3	8.3	**10.2**	**+1.9**	**+6.7**

Figure 1: 2010-2018 national trends in the coverage of health facilities with malaria diagnostics

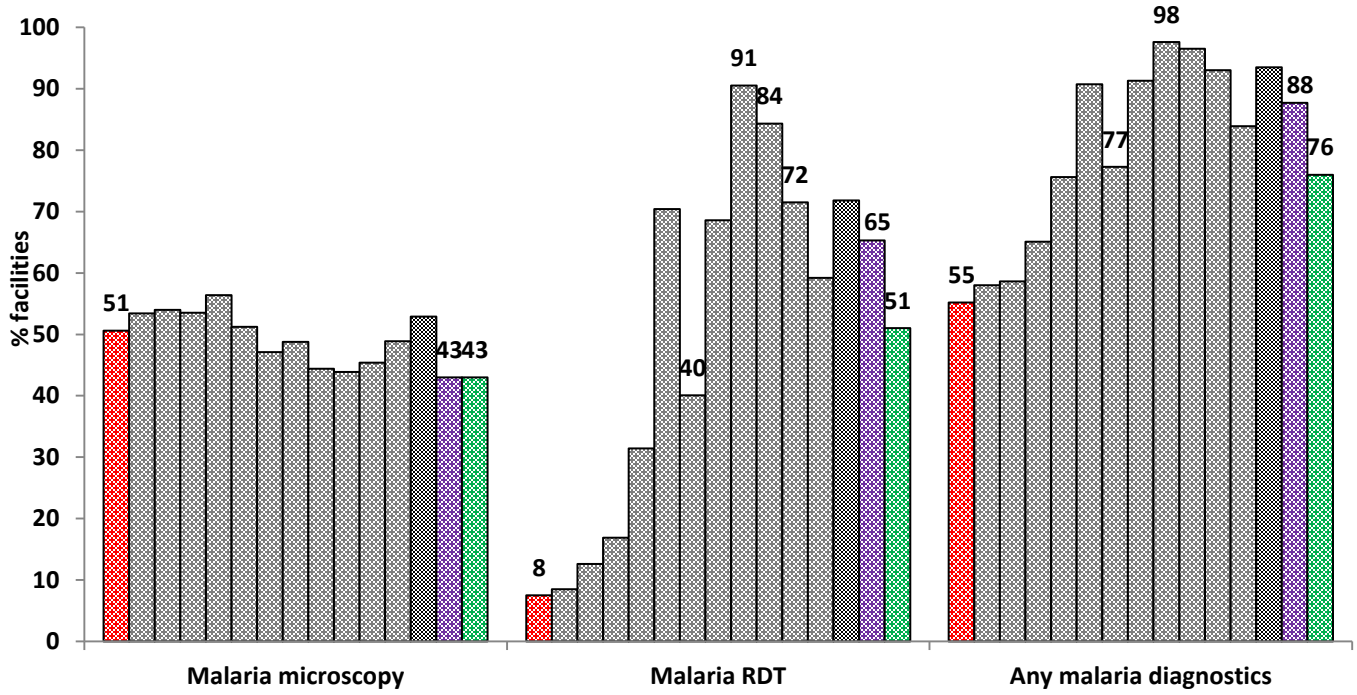
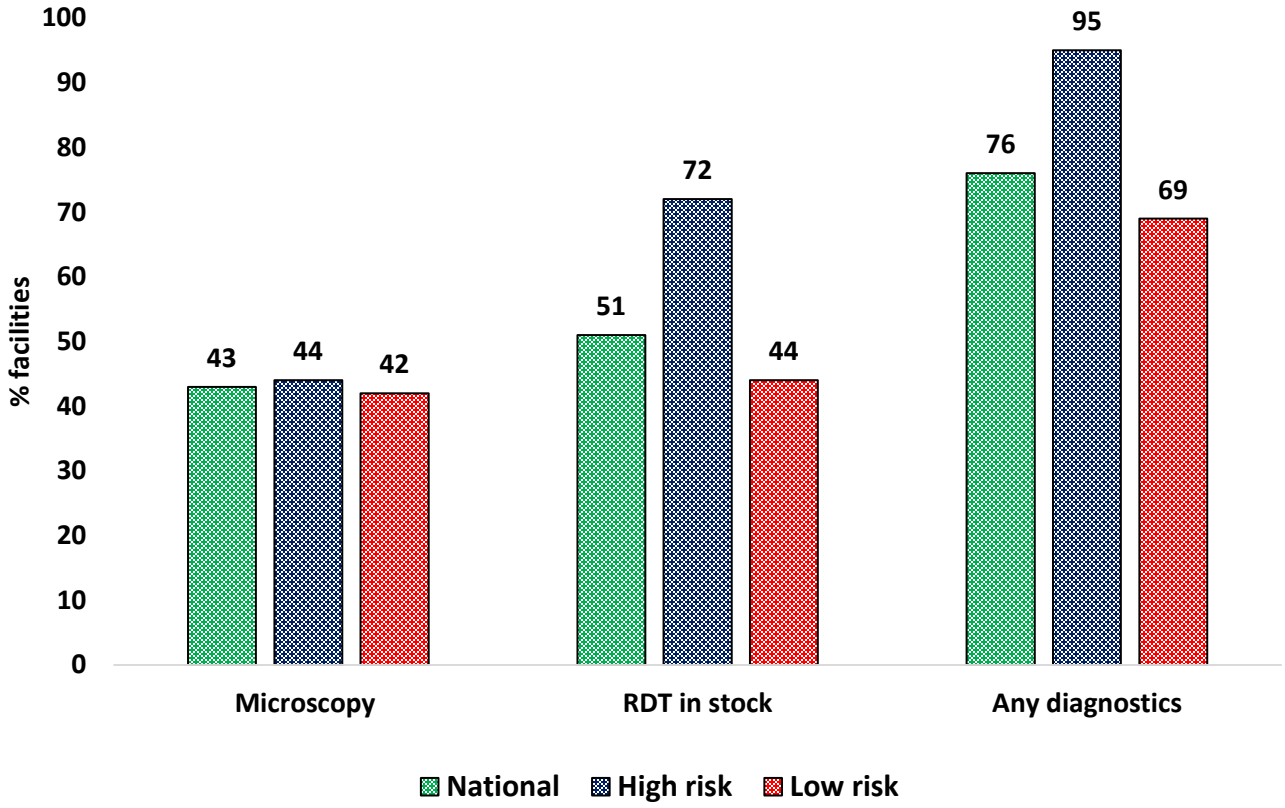


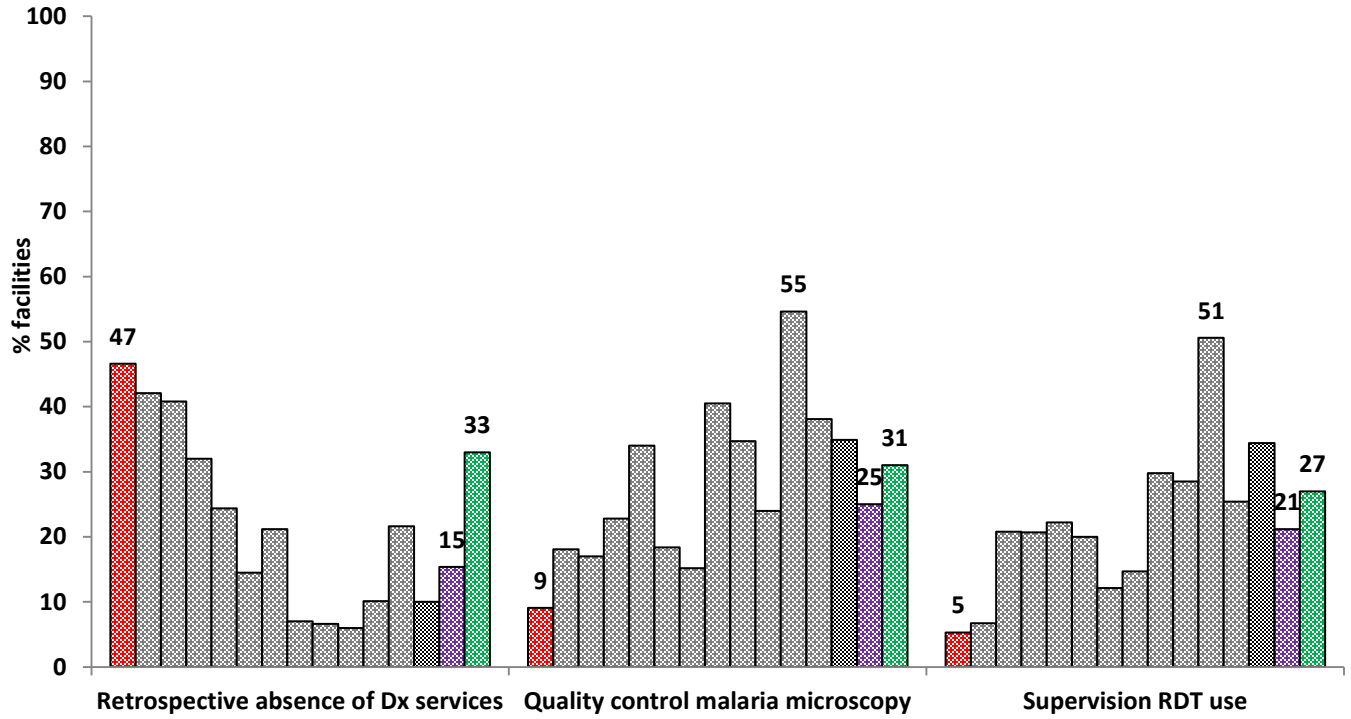
Figure 2 shows the exploratory analysis of the last survey results in the coverage of facilities providing malaria microscopy and RDTs stratified by high and low malaria risk areas. While no significant differences between areas of risk was observed in the proportion of facilities providing malaria microscopy (44.2% vs 42.1%) the availability of RDTs was however significantly higher at facilities in high compared to low malaria risk areas (72.1% vs 43.7%) and subsequently it was the overall capacity of facilities in high risk areas able to provide any type of parasitological malaria diagnosis (95.4% vs 69.1%) (Figure 2).

Figure 2: Availability of malaria diagnostics stratified by malaria risk, Nov-Dec 2018



During each survey round retrospective availability of malaria diagnostic services was assessed for 3-month periods prior to the surveys (Figure 3). The retrospective period prior to the last survey included 90 days between 01 August and 31 October 2018. During this period 32.5% of facilities experienced at least 7 consecutive days without any malaria diagnostic services (neither microscopy nor RDTs). As similarly shown for the survey day assessments, the latest findings confirmed declining trend in diagnostic capacities compared to the previous round in 2018 (15.4%) as well as in comparison to all other assessments since 2014 (Figure 3). Finally, the latest survey revealed that the coverage of facilities providing malaria microscopy which received quality control visit during three months prior to the survey was 30.6% while the coverage with RDT supervisory visits was 27.3%. These two indicators showed minor increase compared to the previous round however they were still at significantly lower levels compared to the highest level of these activities observed during 2016 (Figure 3).

Figure 3: 2010-2018 national trends in the retrospective absence of malaria diagnostics and the coverage with quality control and supervisory activities for microscopy and RDTs

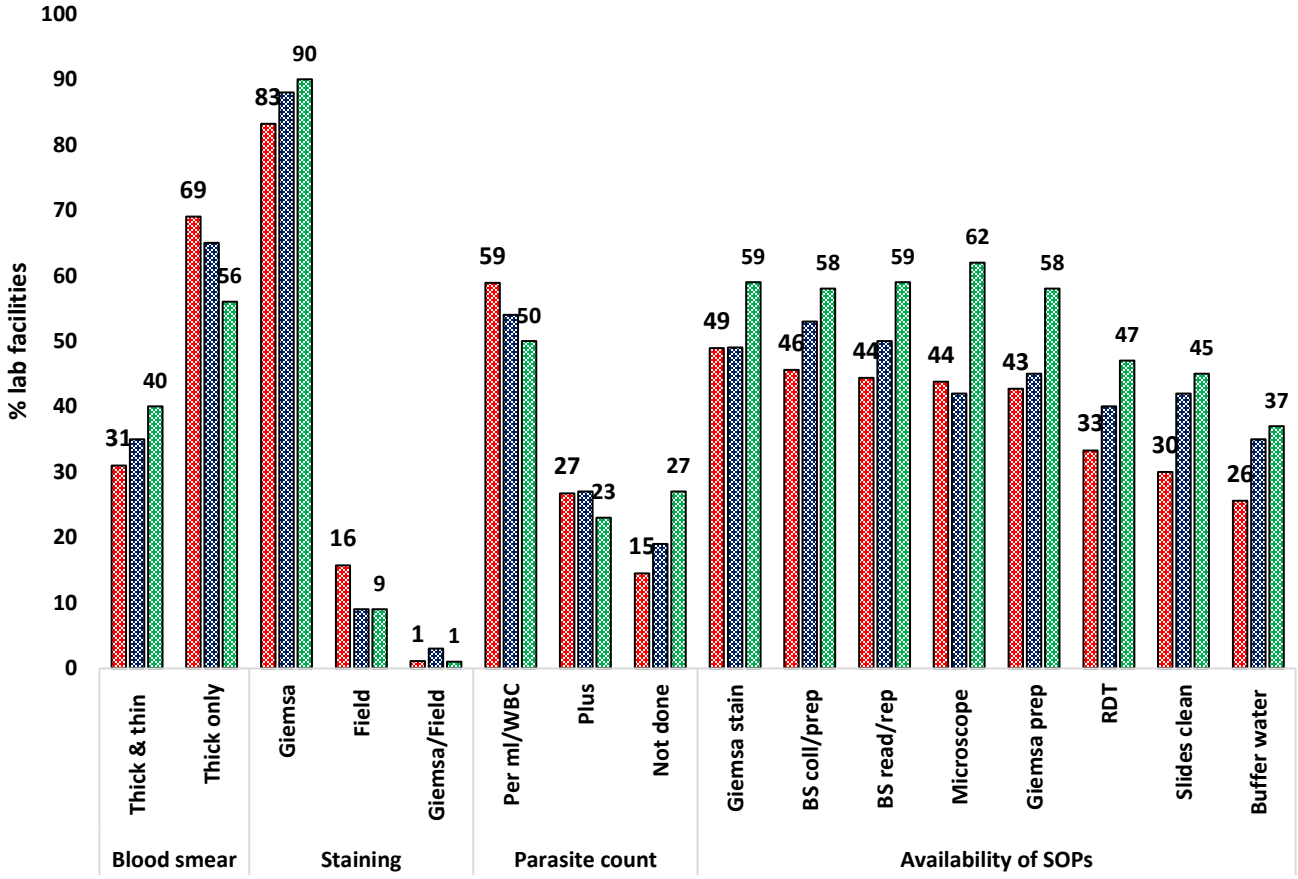


4.2.2. Malaria microscopy practices and quality assurance

Malaria microscopy practices and the facility coverage with quality assurance activities at 71 laboratories providing malaria microscopy on survey days was assessed during the last three survey rounds (Figure 4). Over this period some increasing trends in the proportion of laboratories routinely preparing both thick and thin smears for malaria, as recommended by guidelines, have been observed (31% vs 35% vs 40%). Yet despite these improvements, the latest survey showed that most laboratories still prepare only thick smear for malaria (56%). With respect to the staining of smears, some improvement trends have been observed during the monitoring period and the latest survey revealed 90% of laboratories using recommended Giemsa staining solution. The latest findings however suggested some decline in the proportion of laboratories performing parasite counts (85% to 73%) but also an increase in the availability of approved SOPs for malaria parasitology. The availability of SOPs ranged between 8 SOPs from 37% to 62% and was the highest (58-62%) for those referring to the collection and preparation of blood smears, Giemsa preparation and staining, reading and reporting malaria parasites and use and maintenance of microscopes. Of the basic microscopy supplies, 97% of laboratories stocked immersion oil, 96% slides, 94% lancets, 89% had Giemsa in stock while methanol was less commonly found, at 70% of laboratories.

During each of three assessments, about a third of laboratories reported participating in malaria EQA schemes (34.4%, 37.9% and 35.2%) and when participating a similar and not optimal levels of EQA activities were reported, e.g. storing slides for re-reading (75.9%, 84.0% and 73.9%), receiving written feedback (71.4%, 72.0% and 69.6%) and having EQA results recorded in registers (58.6%, 56.0 and 65.2%). Nearly half of the laboratories during each assessment round (46.1%, 46.2% and 45.1%) reported power cuts interfering with the microscopy performance. Finally, with respect to the exposure of laboratory health workers to the in-service training on malaria microscopy during 3 years prior to the survey, 55.9% reported attending the training, the coverage somewhat higher compared to the previous round (45.2%).

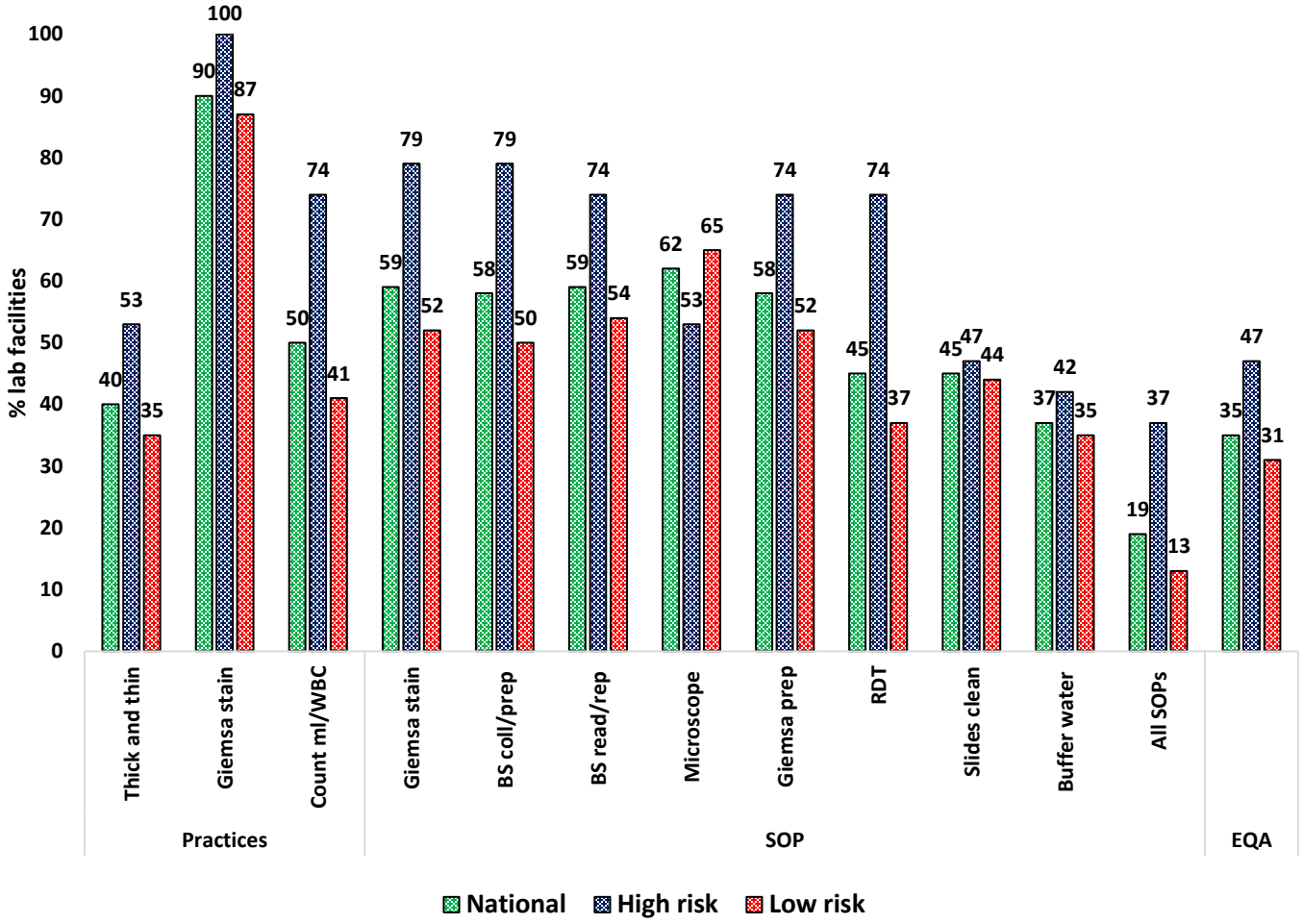
Figure 4: Key malaria microscopy practices and SOP coverage, 2017-2018



Major differences in malaria microscopy practices and in the availability of SOPs were observed at laboratories with respect to malaria risk (Figure 5). Compared to low risk areas, laboratories in high malaria risk area more commonly follow recommended procedures and prepare both thick and thin

smears for malaria (53% vs 35%), use Giemsa staining solution (100% vs 87%), count parasites per ml/WBC (74% vs 41%), participate in malaria EQA schemes (47% vs 31%), have laboratory health workers trained on malaria microscopy in past 3 years (74% vs 49%) and have approved SOPs for malaria parasitology (Figure 5).

Figure 5: Key microscopy practices and SOP availability stratified by malaria risk, Nov-Dec 2018



Highlight: Malaria diagnostic capacities

KEY FINDINGS:

The latest survey found 76% of health facilities able to provide parasitological malaria diagnosis. Despite increased RDT availability compared to the 2010 baseline a major declining trend was seen compared to the previous 2018 round – the availability of RDTs decreased from 65% to 51% while in consequence overall diagnostic capacity declined from 88% to 76%. Moreover, the latest diagnostic capacity levels observed at the end of 2018 are significantly lower compared to the optimum findings in 2015 when nearly all facilities (98%) provided at least one type of the parasitological diagnosis and 91% of facilities stocked non-expired RDTs. Retrospective availability during 3 months prior to the last survey reflected the findings on survey days and showed that 32.5% of facilities experienced absence of malaria diagnostic services. Compared to the previous round, some increase in the coverage of facilities with QC visits on malaria microscopy and supervisory RDT visits have been suggested however the levels observed at the end of the year were low with less than a third of laboratories reporting microscopy QC visit (31%) and 27% of facilities reporting RDT supervisory visits. Rapid laboratory assessments during the last round found that 40% of laboratories routinely prepare both thick and thin smears, 90% use Giemsa solution and 50% report parasite counts per ml or WBC, as recommended by guidelines. The availability of 8 SOPs for malaria parasitology increased during the last rounds and the latest findings show that the coverage was the highest (58-62%) for those referring to the collection and preparation of blood smears, Giemsa preparation and staining, reading and reporting malaria parasites, and the use and maintenance of microscopes. About a third (35%) of laboratories participate in malaria EQA schemes and 56% of laboratory health workers were trained on malaria microscopy in past 3 years

Major differences in parasitological malaria capacities were observed with respect to malaria risk. Compared to low risk areas, facilities in high risk areas were more commonly able to provide parasitological diagnosis (95% vs 69%), stocked RDTs (72% vs 44%), participated in EQA scheme (47% vs 31%), performed thick and thin smears (53% vs 35%), used Giemsa solution (100% vs 87%), counted parasites per ml/WBC (74% vs 41%), had laboratory workers trained on malaria microscopy in past 3 years (74% vs 49%) and had more commonly all SOPs for malaria parasitology (37% vs 13%).

IMPLICATIONS:

Negative trends in the national malaria diagnostic readiness, due to declining availability of RDTs, have continued during 2018. While relatively high diagnostic readiness exists in high malaria risk areas, the additional programmatic interventions are needed in low risk areas to reinforce effective RDT supply chain and expand quality control interventions for malaria parasitology and therefore ensure minimum of malaria diagnostic prerequisites.

4.2.3. Availability of antimalarial drugs

The physical stock assessments during the latest survey revealed that at least one AL pack was stocked by 84.0% of facilities, the levels similar to the previous round (83.5%) however significantly lower compared to the baseline findings (94.3%) and showing a declining trend since 2015 when nearly optimal levels (94.6%) have been observed (Table 3 and Figure 6). The last survey also found that only 23.1% of facilities stocked AL 6 pediatric pack what subsequently resulted in only 11.8% of facilities having all four AL packs

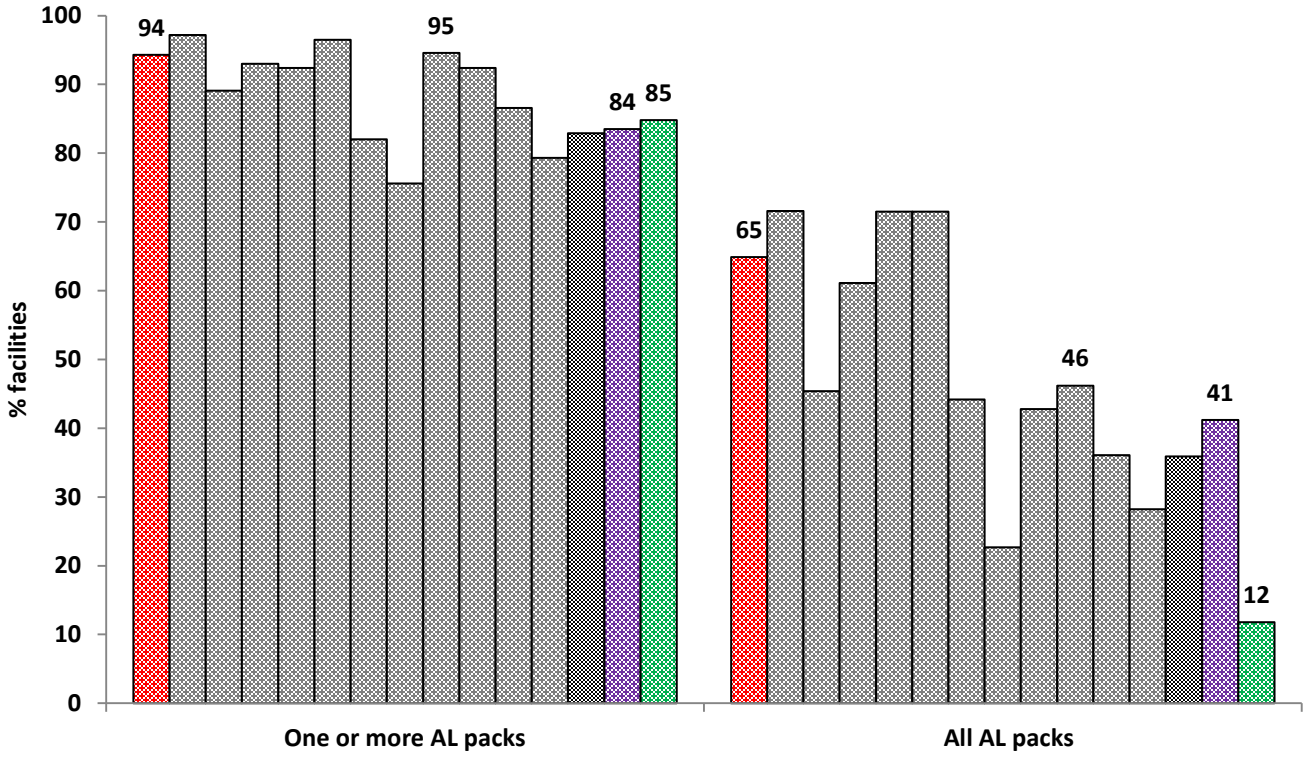
in stock. The most commonly stocked pack, as similarly observed during the previous rounds, was AL 24 pack which was found at 75.4% of facilities. Notably, when health facilities had AL 6 and AL 12 pack in stock, dispersible formulations were respectively stocked by 64.1% and 25.6% of facilities. Conversely to the problem of stock-outs, 14.8% of facilities were also found with at least one expired AL pack. For instance, one sub county hospital in Bungoma stocked 4,770 expired AL packs. With respect to injectable medicines for pre-referral treatment of malaria, 51.5% of facilities stocked Artesunate, 10.7% Quinine, 1.8% Artemether while at least one injectable antimalarial was available at 54.4% of facilities. SP tablets, the recommended medicines for intermittent preventive treatment in pregnancy, were in stock at 88.4% of facilities in areas where IPTp policy is recommended. Finally, DHA-PPQ, the recommended second line treatment for uncomplicate malaria, was found at only 1.2% of facilities, as similarly observed throughout the monitoring period (Table 3).

Table 3: Availability of non-expired antimalarial drugs on survey days

	Base N=174 (%)	FU 1 N=176 (%)	FU 2 N=174 (%)	FU 3 N=172 (%)	FU 4 N=172 (%)	FU 5 N=172 (%)	FU 6 N=172 (%)	FU 7 N=172 (%)	FU 8 N=169 (%)	FU 9 N=172 (%)	FU 10 N=172 (%)	FU 11 N=174 (%)	FU 12 N=170 (%)	FU 13 N=170 (%)	FU 14 N=169 (%)	% diff FU 13 vs FU14	% diff B vs FU14
Any AL pack	94.3	97.2	89.1	93.0	92.4	96.5	82.0	75.6	94.6	92.4	86.6	79.3	82.9	83.5	**84.0**	**+0.5**	**-10.3**
All AL packs	64.9	71.6	45.4	61.1	71.5	71.5	44.2	22.7	42.8	46.2	36.1	28.2	35.9	41.2	**11.8**	**-29.4**	**-53.1**
AL 6 pack	81.0	89.2	78.2	78.5	83.1	86.6	62.8	51.7	62.5	68.2	60.5	59.8	63.5	65.3	**23.1**	**-42.2**	**-57.9**
AL 12 pack	79.9	86.4	59.8	73.3	85.6	83.7	62.8	50.0	48.8	59.4	58.7	59.2	59.4	58.2	**47.9**	**-10.3**	**-30.0**
AL 18 pack	79.3	81.8	66.7	72.7	80.7	83.7	64.5	37.2	82.1	76.3	54.7	39.7	45.3	52.9	**55.6**	**+2.7**	**-23.7**
AL 24 pack	86.2	86.9	73.6	85.5	84.9	89.0	67.4	54.7	88.6	79.5	76.2	64.4	75.3	78.8	**75.2**	**-3.6**	**-11.0**
Quinine tabs	69.0	84.6	80.5	83.5	79.1	80.8	59.9	52.3	63.7	33.1	11.1	9.8	8.9	4.8	**6.5**	**+1.7**	**-62.5**
Quinine inj	77.6	84.5	78.6	69.0	69.0	80.2	67.3	59.3	33.1	25.0	23.3	15.0	14.8	7.7	**10.7**	**+3.0**	**-66.9**
DHA-PPQ	0	0	2.9	0.6	3.5	4.1	2.3	4.7	7.1	0.6	2.9	3.5	1.2	1.8	**1.2**	**-0.6**	**+1.2**
Artesunate inj	0	0.6	1.1	1.2	14.0	20.3	50.0	55.2	66.3	59.3	41.9	48.3	55.6	45.8	**51.5**	**+5.7**	**+51.5**

*At the last round SP was in stock at 88.4% of facilities in high risk areas with IPTp recommendations

Figure 6: 2010-2018 national trends in the availability of AL at health facilities on survey day



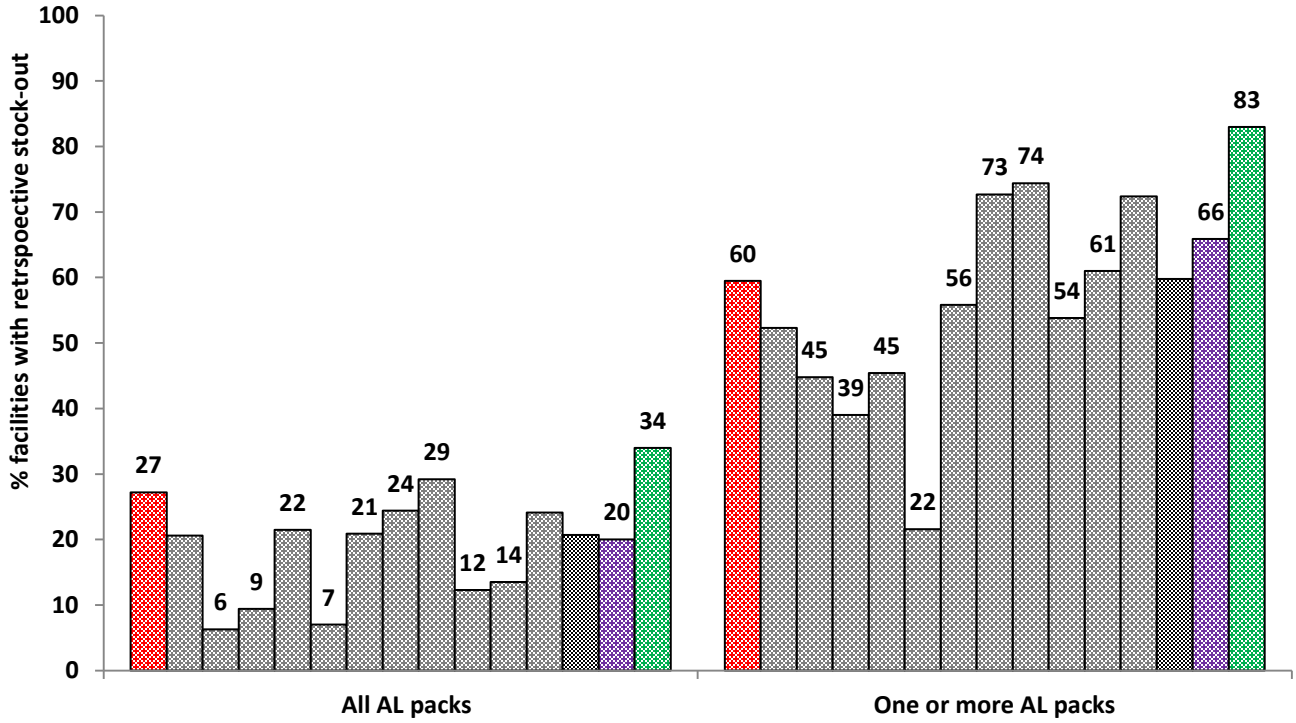
Retrospective stock-out data were collected for the 3-month period prior to the physical surveys. The stock-out was defined as absence of item of interest in duration of at least 7 consecutive days over the whole 3-month period. The retrospective period prior to the last survey included 90 days between 1st August and 31st October 2018. The last survey revealed the highest levels of retrospective AL stock-outs since the beginning of the monitoring period with 34.3% of facilities experiencing total AL stock-out and as high as 82.8% of facilities experiencing stock-out of at least one AL pack (Table 4 and Figure 7). As similarly observed during the survey day assessments, the most common stock-outs were found for AL 6 pack which was out of stock at 76.9% of facilities between August and October 2018 while in the same period the lowest levels of AL stock-outs (34.3%) were found for AL 24 pack (Table 4). In the same period 53.9% of facilities experienced stock-out of injectable Artesunate while in the areas where IPTp is recommended 11.6% of facilities had stock-outs of SP tablets.

Table 4: Retrospective stock-outs of antimalarial drugs during 3 months prior to the surveys

Stock out of at least 7 consecutive days 3 mts prior to the survey	Base N=174 (%)	FU 1 N=176 (%)	FU 2 N=174 (%)	FU 3 N=172 (%)	FU 4 N=172 (%)	FU 5 N=172 (%)	FU 6 N=172 (%)	FU 7 N=172 (%)	FU 8 N=169 (%)	FU 9 N=172 (%)	FU 10 N=172 (%)	FU 11 N=174 (%)	FU 12 N=170 (%)	FU 13 N=170 (%)	FU 14 N=169 (%)	% diff FU 13 vs FU14	% diff B vs FU14
All AL packs	27.2	20.6	6.3	9.4	21.5	7.0	19.9	24.4	29.2	12.3	13.5	24.1	20.7	20.0	**34.3**	**+14.3**	**+7.1**
AL 6 pack	37.6	30.1	19.5	21.1	27.9	15.2	36.3	52.9	46.4	40.4	39.6	42.0	36.7	42.4	**76.9**	**+34.5**	**+39.3**
AL 12 pack	43.9	32.4	31.6	28.7	34.9	14.6	39.0	45.4	60.7	45.6	44.6	42.0	39.1	44.7	**58.0**	**+13.3**	**+14.1**
AL 18 pack	52.0	42.1	27.6	29.8	39.0	17.0	38.6	60.5	50.9	22.2	37.3	64.9	50.9	56.8	**54.4**	**-2.4**	**+2.4**
AL 24 pack	39.3	35.2	19.5	19.9	34.3	10.5	36.1	38.4	44.6	21.1	20.7	36.2	31.4	27.7	**34.3**	**+6.6**	**-5.0**
1 or more AL packs	59.5	52.3	44.8	39.0	45.4	21.6	56.1	72.7	74.4	53.8	61.0	72.4	59.8	65.9	**82.8**	**+16.9**	**+23.3**
Quinine tablets	25.4	22.2	16.1	15.1	24.0	19.9	38.6	42.7	42.3	64.1	84.1	85.9	85.7	93.9	**84.0**	**-9.1**	**+58.6**
Quinine injections	20.8	20.5	17.2	20.9	43.9	22.2	29.2	33.9	60.1	70.1	73.5	78.8	79.8	92.1	**82.1**	**-10.0**	**+61.3**

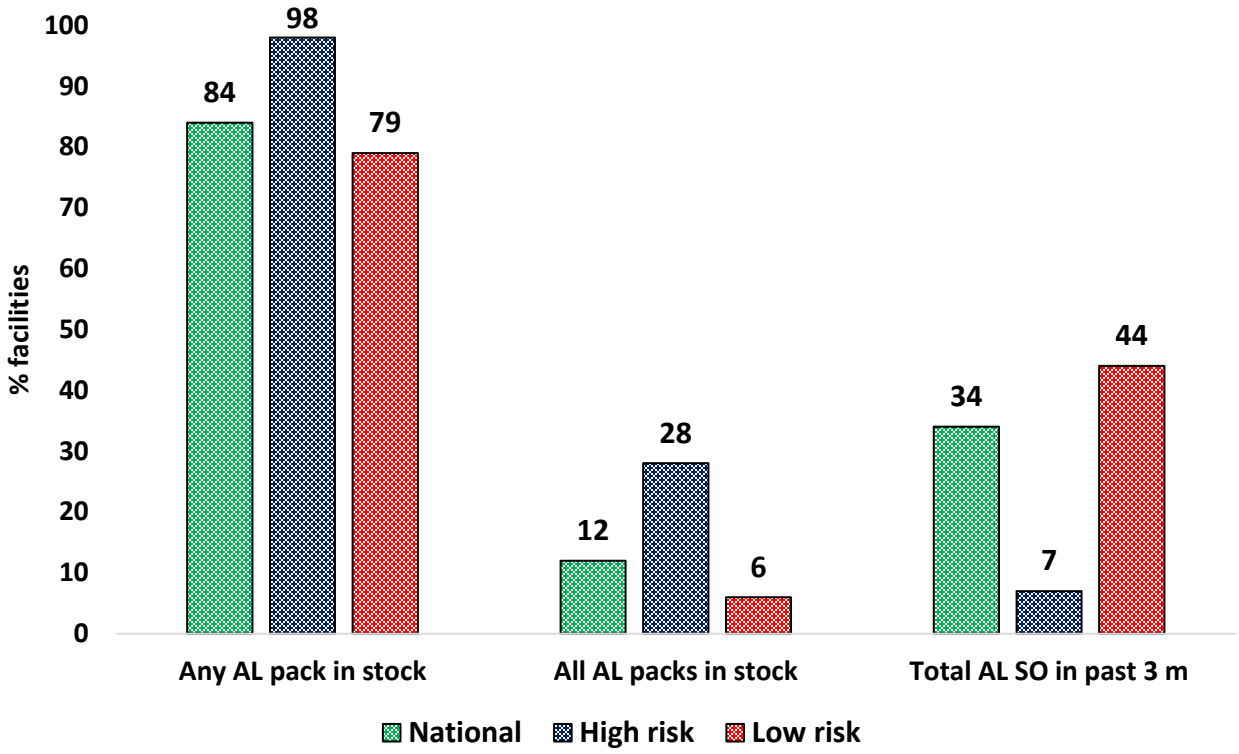
*At the last round SP stock-outs found at **11.6%** of facilities in high risk areas with IPTp recommendations

Figure 7: 2010-2018 national trends in retrospective AL stock-out indicators



The last survey data revealed significant differences in the AL availability with respect to malaria risk (Figure 8). While in high risk areas 98% of facilities had at least one AL pack during the survey days and only 7% were found with simultaneous stock-out of all four AL packs (total stock-out) 3 months prior to the survey, in low risk areas the availability of any AL pack on survey days was significantly lower (79%) and retrospective stock-outs three months prior to the survey were significantly higher (44%) (Figure 8).

Figure 8: Key AL availability indicators stratified by malaria risk, Nov-Dec 2018



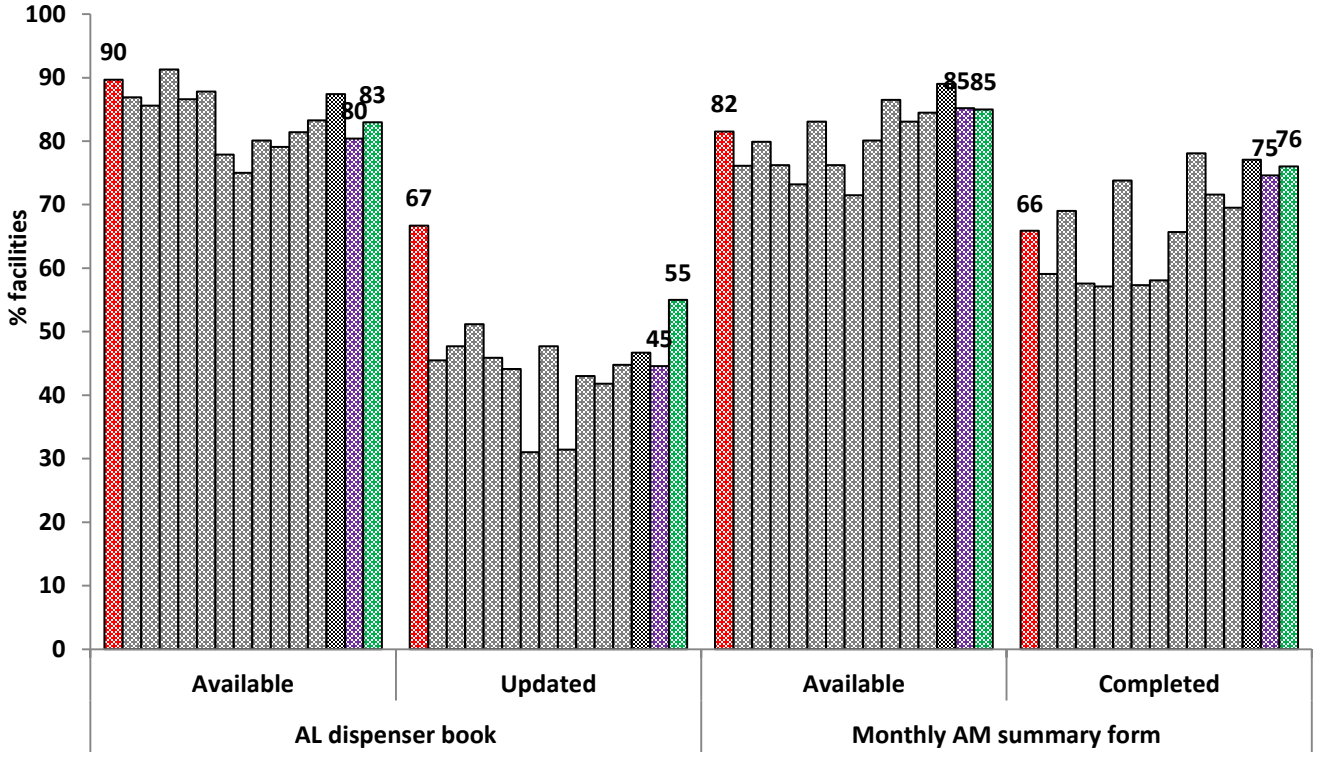
4.2.4. Availability and completeness of antimalarial drug management records

The trends in the availability of the main antimalarial drug management records were generally similar over the monitoring period (Table 5 and Figure 9). The latest survey found 83.4% of facilities having daily activity registers and 84.6% having monthly summary forms for malaria commodities. Only 55.4% of facilities had updated daily activity registers for the last month and 75.5% submitted monthly summary reports for malaria medicines for the 3-month period prior to the survey. Comparing to the previous survey round, some improvements were suggested in updating of daily activity registers (44.6% to 55.4%) while no changes were observed in the submission of monthly summary forms (74.6% vs 75.5%) (Table 5 and Figure 9).

Table 5: Availability and quality of antimalarial drug management records

	Baseline N=174 (%)	FU 1 N=176 (%)	FU 2 N=174 (%)	FU 3 N=172 (%)	FU 4 N=172 (%)	FU 5 N=172 (%)	FU 6 N=172 (%)	FU 7 N=172 (%)	FU 8 N=169 (%)	FU 9 N=172 (%)	FU 10 N=172 (%)	FU 11 N=174 (%)	FU 12 N=170 (%)	FU 13 N=170 (%)	FU 14 N=169 (%)	% diff FU 13 vs FU14	% diff B vs FU14
DAR available	89.7	86.9	85.6	91.3	86.6	87.8	77.9	75.0	80.1	79.1	81.4	83.3	87.4	80.4	**83.4**	**+3.4**	**-6.3**
DAR updated (1m)	66.7	45.5	47.7	51.2	45.9	44.1	31.0	47.7	31.4	43.0	41.8	44.8	46.7	44.6	**55.4**	**+10.8**	**-11.3**
Monthly summary available	81.5	76.1	79.9	76.2	73.2	83.1	76.2	71.5	80.1	86.5	83.1	84.5	89.0	85.2	**84.6**	**-0.6**	**+3.1**
Summary submitted (3m)	65.9	59.1	69.0	57.6	57.1	73.8	57.3	58.1	65.7	78.1	71.6	69.5	77.1	74.6	**75.5**	**+0.9**	**+9.6**
Stock cards available	86.2	77.3	74.7	79.7	84.2	90.1	81.9	85.5	91.6	92.4	93.0	86.8	87.4	87.1	**90.5**	**+3.4**	**+4.3**
Stock cards updated (1m)	44.8	38.6	44.3	42.4	51.2	60.4	49.7	56.4	58.6	66.7	64.7	63.2	63.8	58.8	**74.7**	**+15.9**	**+29.9**

Figure 9: 2010-2018 national trends in the availability and the quality of key antimalarial drug management records



Highlight: Availability of antimalarial medicines and antimalarial drug management records

KEY FINDINGS:

Survey day assessments found 84% of facilities stocking at least one AL pack and only 12% stocking all four packs mainly due to very low availability of AL 6 pack (23%). Retrospective stock-outs 3 months prior to the survey (Aug-Oct 2018) were the highest since the beginning of the monitoring period with 34% of facilities experiencing total AL stock-out and 83% experiencing stock-out of at least one AL pack. The most common AL pack out of stock in this period was AL 6 pack (77%) while the lowest levels of AL stock-outs were found for AL 24 pack (34%). With respect to the availability of antimalarials recommended for the for special patient groups, the last survey found 52% of facilities stocking injectable Artesunate, only 1% DHA-PPQ tablets and 88% of facilities having SP tablets in stock in areas where IPTp policy is recommended. Finally, with respect to the quality of malaria drug management records, the last survey found 55% of facilities with updated daily activity registers and 76% with submitted monthly summary forms.

Major differences in AL availability were observed during the last survey with respect to malaria risk. While in high risk areas 98% of facilities stocked at least one AL pack and 7% experienced total AL stock-out 3 months prior to the survey, in low risk areas the availability of AL on survey days was significantly lower (79%) and retrospective stock-outs were significantly higher (44%).

IMPLICATIONS:

While the availability of first line therapy for malaria is relatively high in high malaria risk areas, stock-outs are very common in low risk areas. Universal availability in high risk areas, mitigation of AL stock-outs in low risk areas and appropriate use of drug inventory materials should be programmatic priority to establish and maintain effective supply chain for antimalarial medicines.

4.2.5. Availability of guidelines and job aids

The latest survey found 52.4% of facilities having valid national malaria case-management guidelines recommending universal “test and treat” policy - the guidelines developed in 2010 and subsequently revised in 2012, 2014 and 2016 without changes in the “test and treat” recommendations for uncomplicated malaria. The coverage was however lower compared to the previous round (70.0%) and lower compared to the rounds since 2014 when during each round over 60% of facilities were found with national guidelines. At the last survey 23.7% of facilities had the latest 2016 edition of the malaria guideline while obsolete guidelines developed before 2010 were still found at 21.3% of facilities. With respect to the diagnosing and treatment wall charts, no differences between the last two rounds were observed in the coverage of facilities with displayed AL dosing and dispensing chart (30.0% vs 30.8%) and the diagnostic algorithm recommending malaria testing across all age groups (18.8% vs 17.2%). Some increase in the coverage was however observed in the proportion of facilities having displayed artesunate administration posters (37.3% vs 30.0%).

Highlight: Availability of case-management guidelines and wall charts

KEY FINDINGS:

The last survey found that valid test and treat guidelines for malaria are available at 52% of facilities, the coverage on decline compared the previous round (70%). The latest guideline edition was available at only 24% of facilities while AL dispensing charts, diagnostic algorithm charts and artesunate posters were respectively displayed at 31%, 17% and 37% of facilities.

IMPLICATIONS:

The coverage is low and dissemination of the latest guidelines and case-management wall charts through the in-service trainings, supervisory visits and commodity supply chain should be a priority.

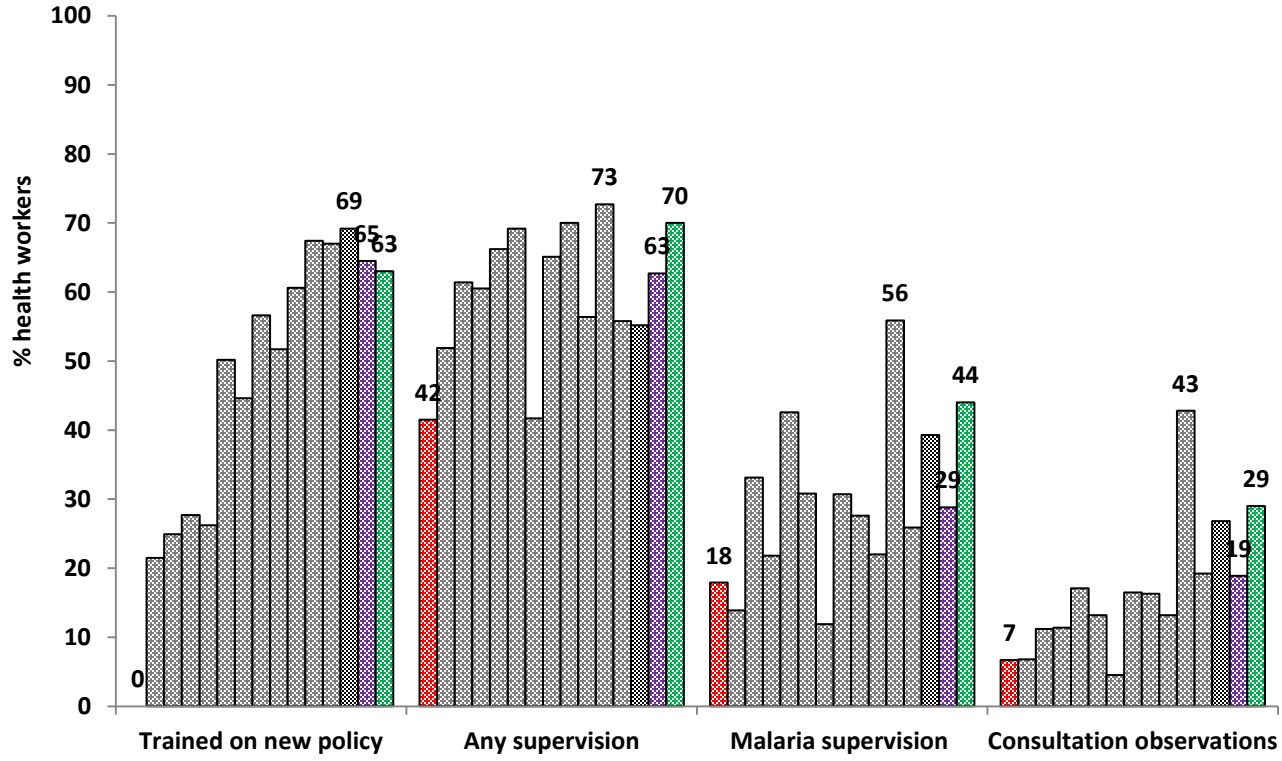
4.2.6. Health workers' exposure to in-service training and supervision

205 health workers who managed outpatients on survey days were interviewed during the last survey. Females represented 56.1%, the median health workers' age was 33 years [range: 21-63] and 44.4% of health workers were the facility in-charges. The majority of health workers were nurses (53.2%) followed by clinical officers (39.0%), doctors (2.4%), CHWs (1.5%), and other cadres (3.9%). At the last survey, nearly two-thirds (63.4%) of health workers reported attending in-service training on "test and treat" malaria case-management policy - the coverage relatively high, but also in the absence of the trainings in 2018, on decline compared to the 2017 when the highest coverage of 69.2% of trained health workers has been observed. Compared to the previously evaluated 3-month period at the beginning of 2018, the latest findings between August and October 2018 suggested some increasing trends in the supportive supervision. Health workers exposure to any type of supervisory visit increased from 62.7% to 70.2%, to the supervisory visit including malaria case-management from 28.8% to 43.7% and to the visit including consultation observations from 18.9% to 28.6%. However, the supervision levels in past two years were significantly lower compared to 2016 when 73% of health workers reported supervisory visit, 56% visit on malaria case-management and 43% were observed doing outpatient consultation (Table 6 and Figure 10).

Table 6: Health workers exposure to in-service training and supervision

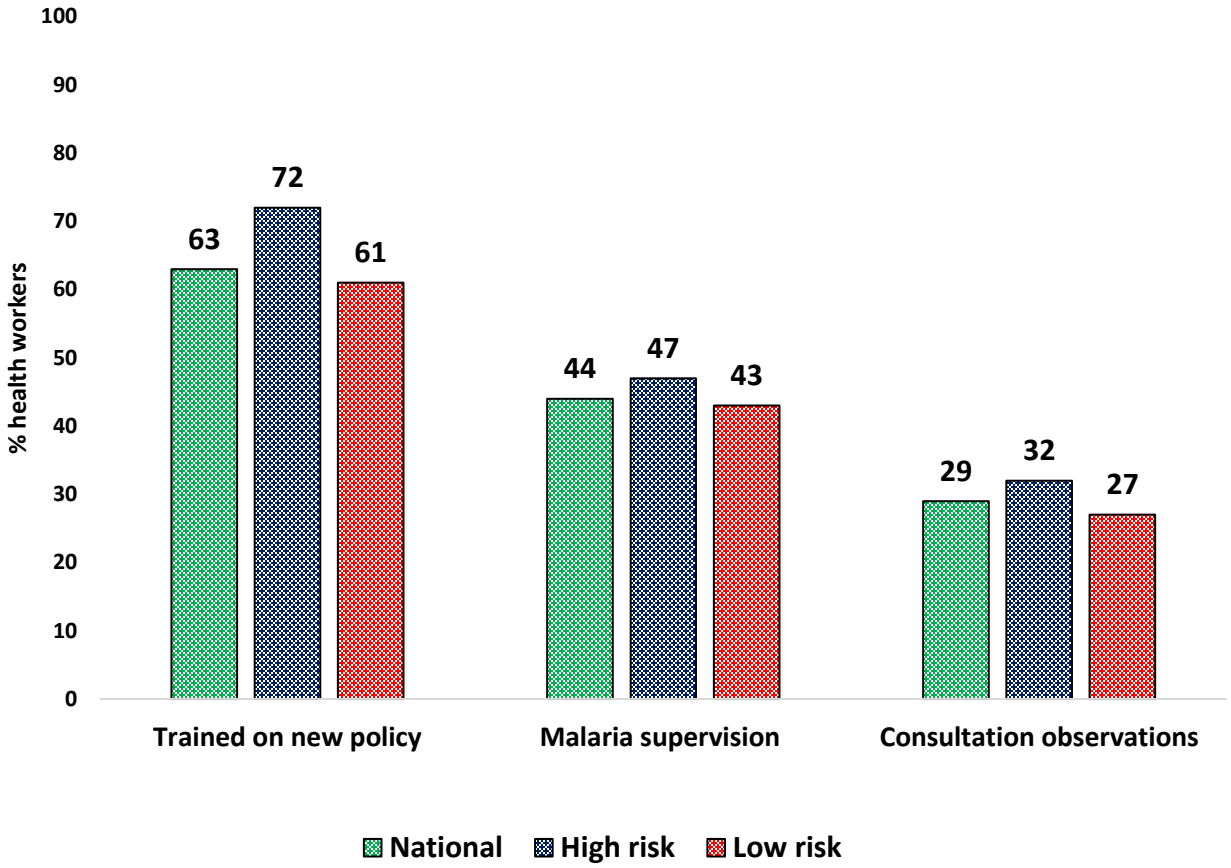
	Baseline N=224 (%)	FU 1 N=237 (%)	FU 2 N=233 (%)	FU 3 N=220 (%)	FU 4 N=216 (%)	FU 5 N=227 (%)	FU 6 N=211 (%)	FU 7 N=211 (%)	FU 8 N=203 (%)	FU 9 N=203 (%)	FU 10 N=224 (%)	FU 11 N=224 (%)	FU 12 N=190 (%)	FU 13 N=214 (%)	FU 14 N=205 (%)	% diff FU 13 vs FU14	% diff B vs FU14
In–service training																	
Trained on new CM policy	0	21.5	24.9	27.7	26.2	50.2	44.6	56.6	51.7	60.6	67.4	67.0	69.2	64.5	**63.4**	**-1.2**	**+63.4**
Supervision																	
Any supervision in past 3m	41.5	51.9	61.4	60.5	66.2	69.2	41.7	65.1	70.0	56.4	72.7	55.8	55.2	62.7	**70.2**	**+7.5**	**+28.7**
Any visit with malaria CM	17.9	13.9	33.1	21.8	42.6	30.8	11.9	30.7	27.6	22.0	55.9	25.9	39.3	28.8	**43.7**	**+14.9**	**+25.8**
Visit including observations	6.7	6.8	11.2	11.4	17.1	13.2	4.5	16.5	16.3	13.2	42.8	19.2	26.8	18.9	**28.6**	**+9.7**	**+21.9**

Figure 10: 2010-2018 national trends in the coverage with in-service training on the new case-management policy and supportive supervision



At the latest survey, the coverage of health workers with in-service malaria case-management training and supportive supervisory visits differed with respect to malaria risk areas however the differences were not significant. Health workers in high malaria risk areas were more commonly trained (72% vs 61%), more commonly received malaria supervision (47% vs 43%) and were more commonly observed performing outpatient consultation (32% vs 27%) (Figure 11). Compared to the previous round, the health workers' exposure to malaria supervision increased in low risk areas (14% to 43%) while an opposite, declining trend was observed in high malaria risk areas (67% to 47%).

Figure 11: Key health worker support indicators stratified by malaria risk, Nov-Dec 2018



Highlight: Health workers' coverage with in-service training and supportive supervision

KEY FINDINGS:

The latest survey revealed that 63% of health workers have been exposed to malaria case-management training. The coverage, in absence of the training programs during 2018, has been on decline since 2017 (69%). The coverage with malaria supportive supervisions continued to be erratic, lower than what was reached in 2015 (56%) however with some increasing trend compared to the previous round (29% to 44%). The latest malaria supervision coverage was without significant differences between high and low malaria transmission areas (47% vs 43%). Similar trends but at low levels of exposure (29%) are found with respect to the visits including observation of consultations.

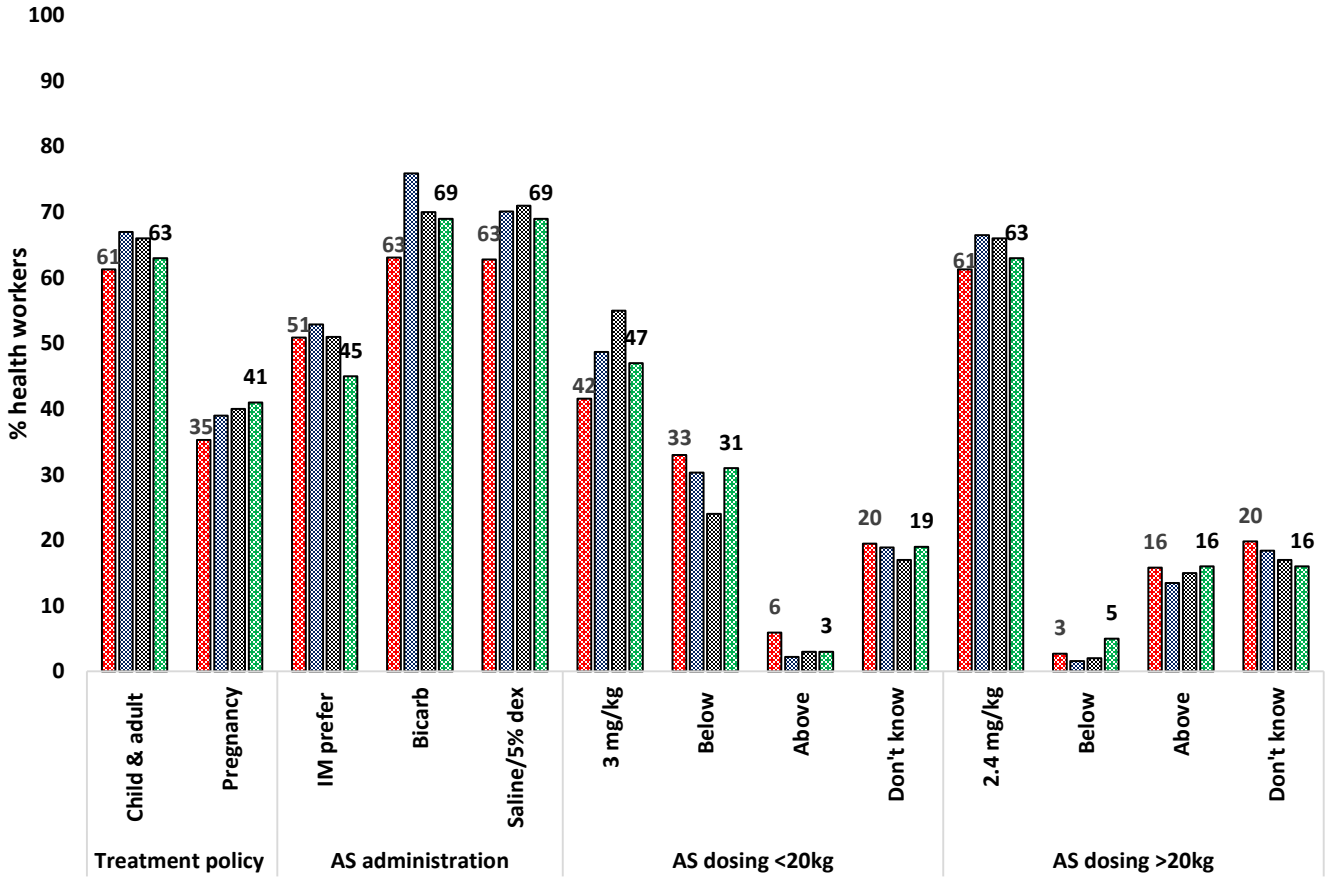
IMPLICATIONS:

Targeted in-service training on malaria case-management and effective scale up of malaria supportive supervision across the country should be an urgent programmatic priority.

4.2.7. Health workers' knowledge about prereferral treatment for severe malaria

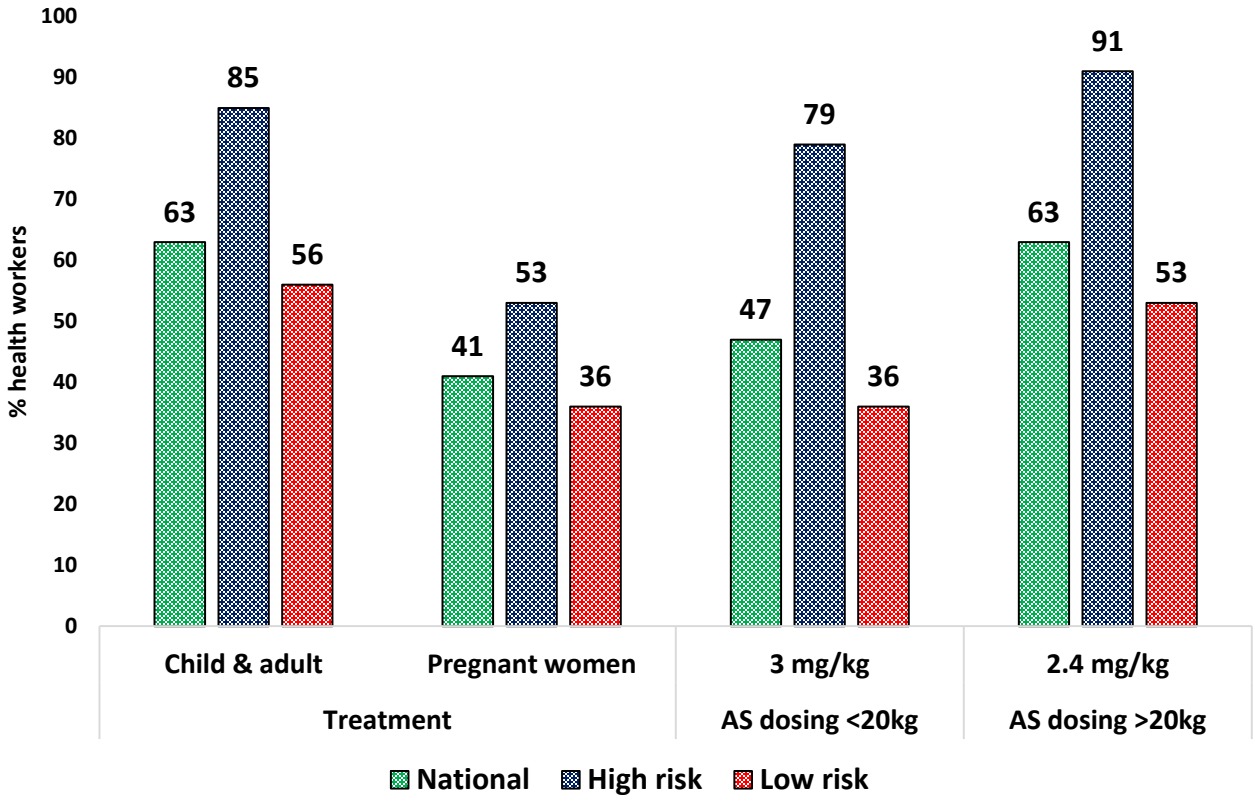
Health workers' knowledge about prereferral treatment policy and artesunate use for severe malaria was assessed during the last four survey rounds using self-administered questions. No significant changes were observed compared to the previous survey round and generally without major changes compared to all assessments since the beginning of the monitoring in 2017 (Figure 12). During the last survey, 63% of health workers knew that artesunate is recommended pre-referral treatment for children/non-pregnant adults; 41% that is recommended for pregnant women; 45% that IM is preferred route of artesunate administration; 60% that it should be reconstituted with bicarbonate; and 69% knew that normal saline or 5% dextrose should be used for dilution of reconstituted artesunate. Regarding the correctness of artesunate dosing, 47% of health workers knew about recommended 3.0mg/kg for children below 20kg and 63% knew that 2.4mg/kg is recommended for patients weighing over 20kg (Figure 12). With respect to the incorrect policy responses, AL and quinine were the most common incorrect treatments stated in the category of children and non-pregnant adults (14.6% and 12.2% respectively) while the quinine was the most common response provided overall for the treatment of pregnant women (44.9%). The most common incorrect responses for the preferred routes of administration comprised IV slow bolus and infusion administrations (40.5% and 7.3% respectively) and the use of water for injection for artesunate reconstitution and dilution (11.2% and 14.1% respectively). With respect to the incorrect dosing, 22.4% of health workers responded that obsolete 2.4mg/kg is artesunate recommended dose for children below 20kg. Finally, less than half (47.8%) of the interviewed health workers reported ever administering IM artesunate before referral, 45.9% reported administering IV artesunate while only 2.0% reported ever administering intrarectal artesunate.

Figure 12: Health workers knowledge about prereferral treatment for severe malaria, 2017-2018



Major differences in health workers knowledge about prereferral malaria treatment policy and artesunate use with were observed between malaria risk areas. Health workers in high risk areas were more knowledgeable about artesunate treatment policy compared to those in low malaria risk areas – both for children/non-pregnant adults (85% v 56%) and for pregnant women (53% vs 36%) but also about recommended artesunate dosing for patients less than 20kg (79% vs 36%) and those over 20kg (91% vs 53%) (Figure 13). Finally, while 87% of health workers in high risk areas reported ever administering any parenteral artesunate before referral only 45% reported the same experience in low risk areas.

Figure 13: Key knowledge indicators about prereferral treatment for severe malaria stratified by malaria risk, Nov-Dec 2018



Highlight: Health workers knowledge about prereferral treatment for severe malaria

KEY FINDINGS:

The last survey showed that less than two-thirds of outpatient health workers (63%) knew about prereferral artesunate treatment policy for severe malaria for children and non-pregnant adults and only 41% knew about prereferral treatment policy for pregnant women. The knowledge about recommended artesunate dosing was 47% for children below 20kg and 63% for patients >20kg. Since the beginning of monitoring in 2017 no significant improvements have been observed in the knowledge about prereferral treatment for malaria. Health workers in high risk areas are more knowledgeable about prereferral artesunate treatment policies compared to those in low malaria risk areas – both for children/non-pregnant adults (85% v 56%) and for pregnant women (53% vs 36%), but also about recommended artesunate dosing of 3mg/kg for patients < 20kg (79% vs 36%) and of 2.4mg/kg for patients over 20kg (91% vs 53%).

IMPLICATIONS:

Health workers knowledge about recommended prereferral treatment for severe malaria is suboptimal, particularly in low malaria risk areas and for pregnant women. Prereferral treatment standards for severe malaria should be further emphasized during the in-service trainings and supervisory visits including further dissemination of updated guidelines and artesunate job aids.

4.3. Malaria case-management

Malaria case-management practices were described for febrile, non-pregnant patients weighing ≥5kg and presenting for an initial outpatient visit without being referred for hospitalization. The presentation of the results followed the multi-level analytic approach of the study. First, to assess the performance of the case-management policy the results are presented from all health facilities regardless of the availability of case-management commodities. Second, to assess health workers adherence to the guidelines the same results were restricted to the facilities where AL and diagnostics were in stock on the survey day. Third, at facilities with available AL, the quality of AL dosage prescriptions, and the quality of dispensing and counseling practices was respectively restricted to patients who had AL prescribed and to those who had both, AL prescribed and dispensed at facility. Finally, case-management results were stratified for patients below and above 5 years of age, and by high and low malaria risk.

4.3.1. Main patients' characteristics

Main patients' characteristics across all survey rounds are shown in Table 7. Patients' characteristics were similar between surveys with respect to patients' sex, age, weight, and prior use of antimalarial drugs. Across all surveys 54 to 59% of patients were female, 36 to 46% were below 5 years of age, 1 to 5% of patients took any antimalarial prior to the facility visit, and only 0.4 to 1.4% took complete AL course. The last survey found 42.4% of patients presenting with temperature ≥37.5ºC, the proportion similar to the previous 2018 round (41.6%) and lower compared to the 2017 round (53.2%) when nurses' strike affected health seeking behavior and resulted in higher rates of severe cases attending health facilities. At the last survey, 52.6% of patients were female, 35.5% below 5 years of age, 2.3% patients took any antimalarial prior to the facility visit, 2.0% took AL while only 0.9% of patients had completed AL treatment prior to the facility visit (Table 7).

Table 7: Main characteristics of febrile patients across surveys, 2010-2018

	Base N=2,405 (%)	FU 1 N=1,456 (%)	FU 2 N=1,208 (%)	FU 3 N=1,291 (%)	FU 4 N=1,245 (%)	FU 5 N=1,431 (%)	FU 6 N=1,218 (%)	FU 7 N=988 (%)	FU 8 N=856 (%)	FU 9 N=694 (%)	FU 10 N=845 (%)	FU 11 N=752 (%)	FU 12 N=566 (%)	FU 13 N=830 (%)	FU 14 N=643 (%)
Female	56.1	53.8	55.3	57.9	58.1	55.2	55.9	54.2	55.1	54.9	58.8	58.9	58.1	54.1	52.6
Age															
<1 year	12.0	13.7	9.3	13.5	11.4	9.2	11.1	8.6	12.0	14.0	6.5	9.1	9.5	7.5	8.4
1-4 years	32.5	32.6	35.0	31.5	29.6	32.2	34.2	31.3	32.2	32.0	30.6	30.8	26.3	31.3	27.1
5-14 years	21.1	18.1	18.8	19.2	21.3	28.6	22.7	26.6	25.5	20.8	31.4	26.6	29.0	27.5	24.3
≥15 years	34.4	35.5	36.9	35.8	37.8	30.1	32.1	33.5	30.3	33.3	31.5	33.6	35.2	33.7	40.3
Weight															
5-14 kg	41.0	41.4	39.1	41.7	37.1	36.1	40.9	36.9	39.7	41.8	32.5	35.5	31.6	33.0	31.2
15-24 kg	17.1	17.3	16.8	15.5	17.2	23.4	17.0	17.3	18.4	16.1	20.7	19.1	18.0	19.6	17.8
25-34 kg	5.0	4.3	4.2	4.6	5.6	7.1	7.2	8.6	7.4	6.1	8.9	8.4	8.4	9.7	7.8
≥35 kg	37.0	36.7	38.9	38.3	40.1	33.4	34.2	37.1	34.3	35.9	37.9	36.9	42.1	37.7	43.3
Temperature ≥37.5^{o}	26.3	31.1	30.9	23.8	27.6	35.1	26.4	24.2	34.5	33.0	33.2	32.1	53.2	41.6	42.4
Prior use of any AM	5.0	4.6	4.6	3.3	4.8	4.5	2.5	2.5	4.6	1.9	3.1	1.9	1.8	1.3	2.3
Prior use of AL	1.9	1.5	2.4	2.4	3.1	3.4	2.1	2.0	3.5	1.4	2.3	1.2	1.6	1.1	2.0
Complete prior AL use	0.5	0.6	1.2	0.6	0.7	1.0	0.9	0.6	1.4	0.4	0.8	0.4	0.4	0.4	0.9

4.3.2. Performance of the diagnostic and treatment policy

The performance of case-management "test and treat" policy was assessed at all study facilities regardless of the availability malaria diagnostics and AL. The composite case-management indicator included performance of all of the following tasks: 1) testing of patients with fever for malaria; 2) treatment of test positive patients with AL, and 3) no antimalarial treatment for test negative patients. The latest survey found composite performance of 50.9% (46.9% in children below5 years and 53.0% in patients 5 years and older), the level 35.2% higher than observed at the baseline (15.7%) however on declining trend compared to the previous rounds and indeed at the lowest levels since 2014 when the major national stock-out of RDTs severely compromised malaria case-management.

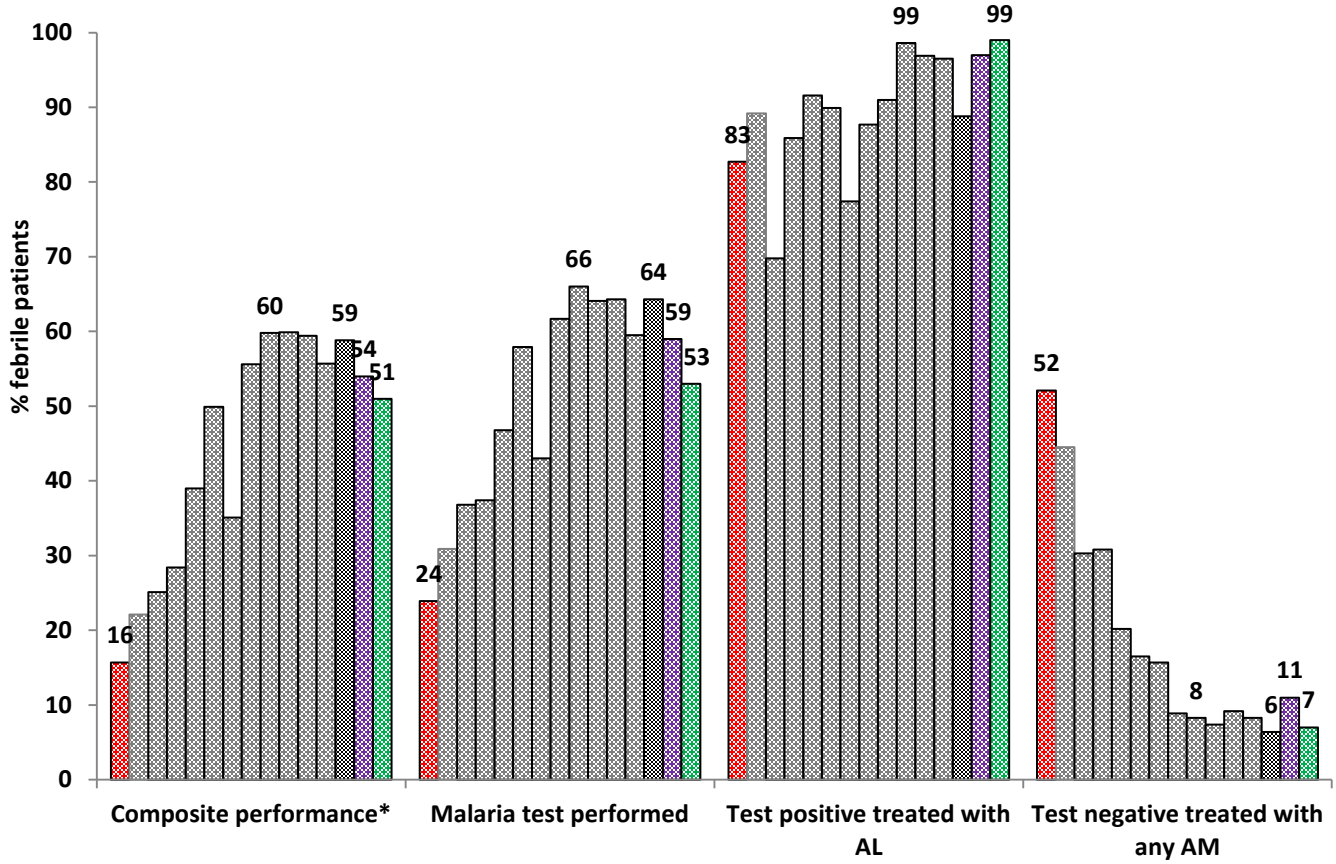
The decline in the overall composite performance was mainly due to the declining testing rates. The last survey found 53.3% of patients with fever tested (47.4% of children and 56.6% of patients over 5 years), the levels 29.4% higher compared to the baseline (23.9%) but also 5.5% and 11.0% lower compared to the previous two survey rounds (58.6% and 64.3% respectively) and, as observed for the composite performance, being at the lowest level since 2014 (Table 8 and Figure 14).

Among malaria test positive patients, the last survey round found that AL was prescribed for nearly all patients (98.5%), an increase by 15.8% compared to the baseline (82.7%) and at the similar levels as observed during the previous round (96.9%). Among malaria test negative patients, the last survey also found low levels of non-recommended practices with only 6.7% of patients inappropriately treated with antimalarials (and all of them with AL) what represented a major 45.4% improvement compared to the baseline when 52.1% of test negative patients were treated for malaria. Notably during the latest survey only 1.4% of test negative children below 5 years were treated for malaria while this practice was more common (9.6%) among patients over 5 years with negative malaria test. Finally, the latest survey found that only 5.3% of patients which are not tested for malaria were treated with an antimalarial what mirrored levels during 2017 and 2018 rounds (5.6-5.8%) and reflected a major decline compared to the 2010 baseline results (67.8%) (Table 8).

Table 8: Performance of the new case-management policy - diagnostic and treatment practices for febrile patients presenting to all health facilities regardless of the availability of commodities

	Baseline N=2,405 (%)	FU 1 N=1,456 (%)	FU 2 N=1,208 (%)	FU 3 N=1,291 (%)	FU 4 N=1,245 (%)	FU 5 N=1,431 (%)	FU 6 N=1,218 (%)	FU 7 N=988 (%)	FU 8 N=856 (%)	FU 9 N=694 (%)	FU 10 N=844 (%)	FU 11 N=751 (%)	FU 12 N=566 (%)	FU 13 N=830 (%)	FU 14 N=643 (%)	% diff FU 13 vs FU14	% diff B vs FU14
Composite performance	15.7	22.1	25.1	28.4	39.0	49.9	35.1	55.6	59.8	59.9	59.4	55.7	58.8	53.9	**50.9**	**-3.0**	**+35.2**
Malaria test performed	23.9	30.9	36.8	37.4	46.8	57.9	43.0	61.7	66.0	64.1	64.3	59.5	64.3	58.6	**53.3**	**-5.3**	**+29.4**
Rx for test positives	**N=295**	**N=212**	**N=205**	**N=191**	**N=180**	**N=343**	**N=168**	**N=204**	**N=268**	**N=141**	**N=261**	**N=170**	**N=161**	**N=195**	**N=135**		
AL	82.7	89.2	69.8	85.9	91.6	90.1	77.4	87.7	91.0	98.6	96.9	96.5	88.8	96.9	**98.5**	**+1.6**	**+15.8**
AL+QN	10.2	0.9	12.2	9.9	2.8	4.1	10.1	5.9	1.9	0	2.3	0.6	0	2.1	**0**	**-2.1**	**-10.2**
QN	4.1	3.3	12.7	1.6	4.4	3.8	3.0	2.0	0	0	0	0	0.6	0	**0**	**0**	**-4.1**
Other AM	2.4	3.8	2.9	1.0	0.6	0.6	7.7	2.9	6.0	0.7	0.8	0.6	10.6	1.0	**1.5**	**+0.5**	**-0.9**
No AM prescribed	0.7	2.8	2.4	1.6	0.6	1.5	1.8	1.5	1.1	0.7	0	2.4	0	0	**0**	**0**	**-0.7**
Rx for test negatives	**N=280**	**N=238**	**N=239**	**N=292**	**N=402**	**N=485**	**N=356**	**N=406**	**N=291**	**N= 299**	**N=273**	**N=277**	**N=203**	**N=291**	**N=208**		
AL	34.6	39.9	24.3	25.7	17.2	12.8	11.0	8.6	7.9	7.0	9.2	7.6	6.4	10.7	**6.7**	**-4.0**	**-27.9**
SP	11.4	3.4	2.5	1.7	1.2	0.6	3.4	0.3	0	0	0	0.4	0	0	**0**	**0**	**-11.4**
AL+QN	2.9	0	1.3	2.1	0.3	0.2	0.3	0	0	0	0	0	0	0	**0**	**0**	**-2.9**
QN	1.8	0.4	1.7	0.7	0.3	2.5	0.6	0	0.3	0	0	0	0	0	**0**	**0**	**-1.8**
Other AM	1.4	0.8	0.4	0.7	1.2	0.4	0.5	0	0.0	0.3	0	0.4	0	0.7	**0**	**-0.7**	**-0.7**
No AM prescribed	47.9	55.5	69.8	69.2	79.9	83.5	84.2	91.1	91.7	92.6	90.8	91.7	93.6	88.7	**93.3**	**+4.6**	**+45.4**
Any AM prescribed	52.1	44.5	30.3	30.8	20.2	16.5	15.7	8.9	8.3	7.4	9.2	8.3	6.4	11.3	**6.7**	**-4.6**	**-45.4**
Rx when test not done	**N=1,830**	**N=1,006**	**N=764**	**N=808**	**N=663**	**N=603**	**N=694**	**N=378**	**N=292**	**N=249**	**N=301**	**N=304**	**N=202**	**N=344**	**N=300**		
AL	59.8	55.4	48.2	45.7	31.4	21.6	27.7	13.0	2.7	5.2	8.6	5.3	5.0	5.8	**5.0**	**-0.8**	**-53.8**
AL+QN	3.1	1.5	2.8	1.7	2.3	1.0	1.3	1.0	0	0	3.0	0	0	0	**0**	**0**	**-3.1**
SP	2.9	1.4	2.5	1.2	1.4	0.2	1.3	0	0	0	0	0.3	0	0	**0**	**0**	**-2.9**
QN	1.6	1.1	2.9	0.4	3.6	0.5	0.9	0.8	0.3	0	0	0	0	0	**0**	**0**	**-1.6**
Other AM	0.5	0.5	0.3	0.5	0.5	0.5	1.9	0	0.3	0	0	0	0.5	0	**0.3**	**+0.3**	**-0.2**
No AM prescribed	32.2	40.2	43.3	50.5	60.9	76.3	67.0	85.2	96.6	94.8	88.4	94.4	94.6	94.2	**94.7**	**+0.5**	**+62.5**
Any AM prescribed	67.8	59.8	56.8	49.5	39.1	23.7	33.0	14.8	3.4	5.2	11.6	5.6	5.5	5.8	**5.3**	**-0.5**	**-62.2**

Figure 14: 2010-2018 national trends in the diagnostic and treatment performance of the new case-management policy



4.3.3. Health workers adherence to the diagnostic and treatment guidelines

Recognizing availability malaria commodities as the pre-requisite for "test and treat" case management practices in accordance with guidelines, health workers adherence to the diagnostic and treatment guidelines is reported from health facilities where malaria diagnostics and AL were available during the survey days. At these facilities, compared to all facility analysis, higher levels of the composite case-management performance and higher testing rates for febrile patients have been observed throughout the monitoring period. With respect to the trends, major improvements were observed compared to the baseline findings however without significant changes in practices since 2015 (Table 9 and Figure 15).

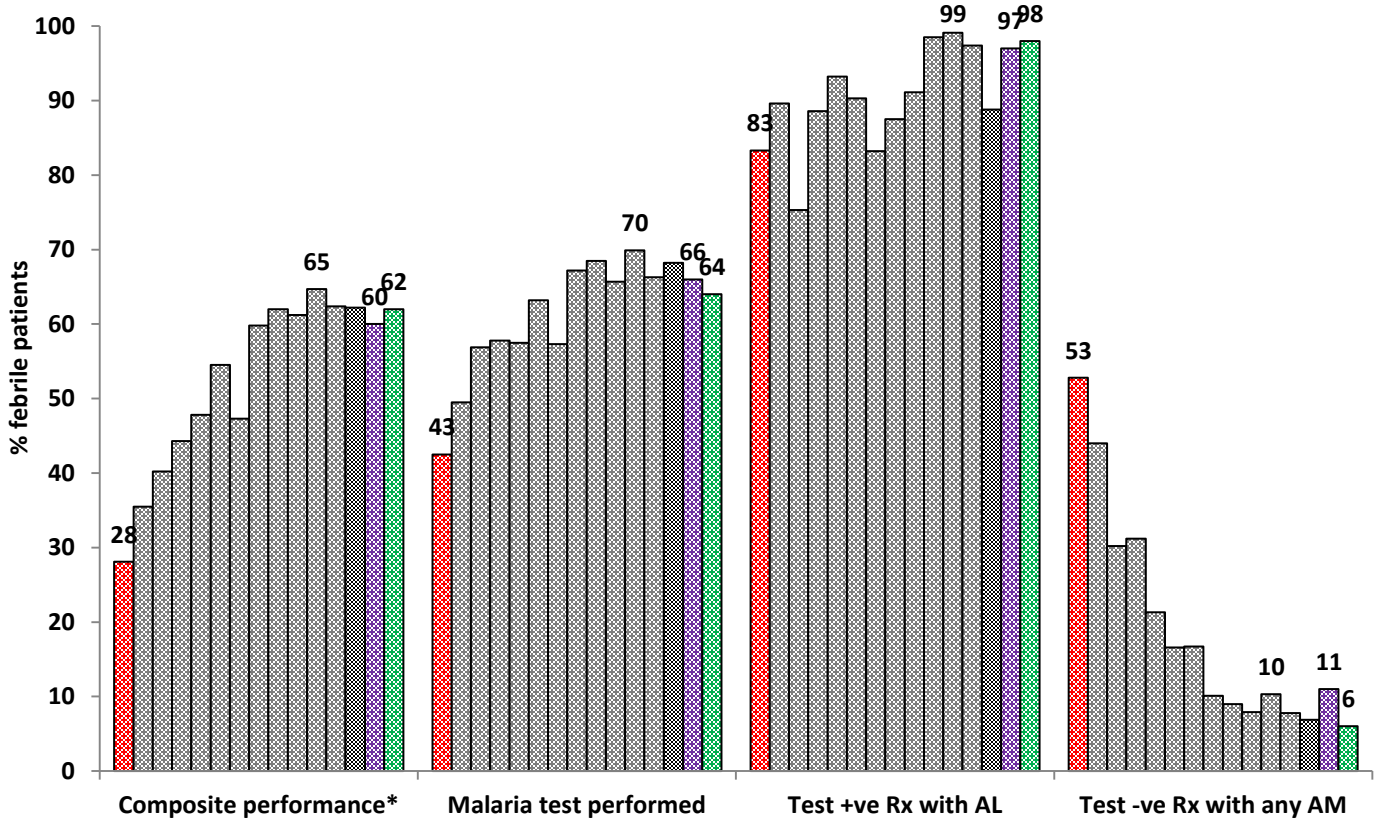
Composite performance at these facilities increased from 28.1% at baseline to 61.5% at the last survey (+33.4%) while testing rates improved in the same period from 42.5% to 64.3% (+21.8%). These improvements have been observed in both age groups – in children below 5 years of age the composite performance increased by 39.3%, from 19.3% to 58.6%, while in older children and adults the same indicator improved by 27.0%, from 36.1% at the baseline to 63.1% during the last survey. Testing rates by

age groups have shown a similar pattern – they increased in children below 5 years testing by 25.9% (33.3% to 59.2%) while in older children and adults testing rates increased by 16.4% (50.8% to 67.2%). Despite smaller improvements in patients 5 years and older, due to higher baseline value of testing in this age group, we observed higher testing rates at the last survey compared to the young children (67.2% vs 59.2%). With respect to test positive, test negative and not tested patients, 98.4% of test positive patients were prescribed recommended AL during the last survey, only 6.4% of test negative patients were inappropriately treated with an antimalarial and none of the febrile patients not tested for malaria was prescribed an antimalarial treatment, indicating discontinuation of the presumptive treatment practices in the presence of diagnostics. Compared to the baseline, the prescribed recommended treatment for test positive patients increased by 15.1% while antimalarial treatment for test negative patients declined by 46.4% (Table 9 and Figure 15). Finally, the last survey results showed that patients seen by health workers exposed to malaria case-management training were more commonly tested (68.2% vs 55.4%) and less commonly prescribed an antimalarial when test result was negative (2.8% vs 7.8%).

Table 9: Health workers adherence to guidelines - diagnostic and treatment practices for febrile patients presenting to facilities where malaria diagnostic services were available and AL was in stock

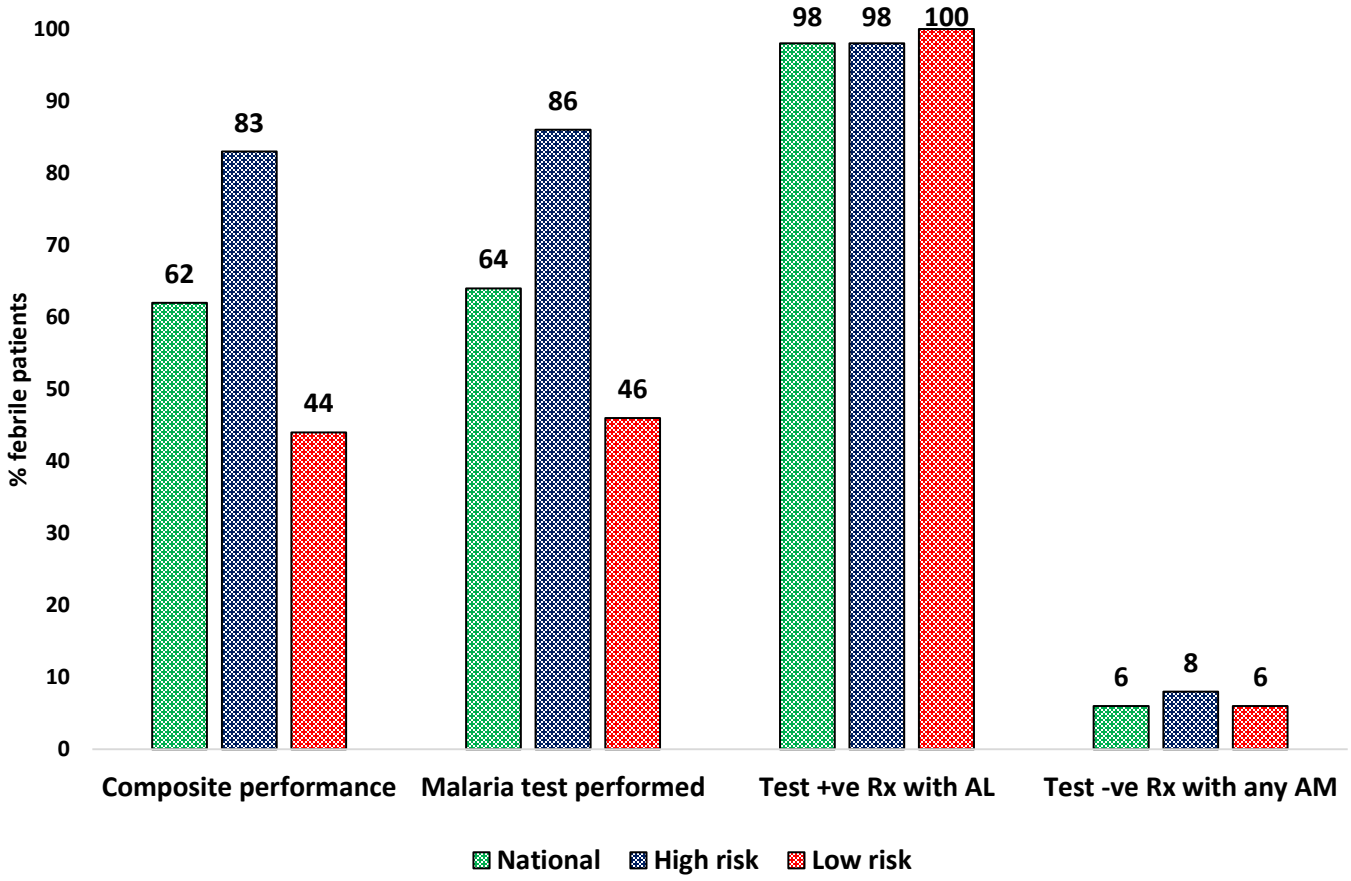
	Baseline N=1,239 (%)	FU 1 N=861 (%)	FU 2 N=634 (%)	FU 3 N=769 (%)	FU 4 N=919 (%)	FU 5 N=1,302 (%)	FU 6 N=771 (%)	FU 7 N=762 (%)	FU 8 N=771 (%)	FU 9 N=629 (%)	FU 10 N=674 (%)	FU 11 N=614 (%)	FU 12 N=500 (%)	FU 13 N=706 (%)	FU 14 N=488 (%)	% diff FU 13 vs FU14	% diff B vs FU14
Composite performance	28.1	35.5	40.2	44.3	47.8	54.5	47.3	59.8	62.0	61.2	64.7	62.4	62.2	60.3	**61.5**	**+1.2**	**+33.4**
Malaria test performed	42.5	49.5	56.9	57.8	57.5	63.2	57.3	67.2	68.5	65.7	69.9	66.3	68.2	65.6	**64.3**	**-1.3**	**+21.8**
Rx for test positives	**N=276**	**N=201**	**N=154**	**N=175**	**N=162**	**N=340**	**N=137**	**N=184**	**N=257**	**N=130**	**N=220**	**N=151**	**N=152**	**N=193**	**N=127**		
AL	83.3	89.6	75.3	88.6	93.2	90.3	83.2	87.5	91.1	98.5	99.1	97.4	88.8	96.9	**98.4**	**+1.5**	**+15.1**
AL+QN	10.5	1.0	14.9	8.6	3.1	3.8	11.6	6.5	1.6	0	0	0	0	2.1	**0**	**-2.1**	**-10.5**
QN	4.0	3.5	5.2	1.1	3.1	3.8	2.2	2.2	0	0	0	0	0.7	0	**0**	**0**	**-4.0**
Other AM	1.5	3.5	2.0	1.1	0.6	0.6	1.5	3.3	6.2	0.8	0.9	0.7	10.5	1.0	**1.6**	**+0.6**	**+0.1**
No AM prescribed	0.7	2.5	2.6	0.6	0.0	1.5	1.5	0.5	1.2	0.7	0	2.0	0	0	**0**	**0**	**-0.7**
Rx for test negatives	**N=250**	**N=225**	**N=205**	**N=269**	**N=366**	**N=483**	**N=305**	**N=328**	**N=268**	**N= 279**	**N=243**	**N=256**	**N=189**	**N=270**	**N=187**		
AL	35.6	40.4	23.9	26.4	18.3	12.8	12.1	9.8	8.6	7.5	10.3	7.0	6.9	10.7	**6.4**	**-4.3**	**-31.3**
SP	10.8	2.7	2.9	1.9	1.1	0.6	3.6	0.3	0	0	0	0.4	0	0	**0**	**0**	**-10.8**
AL+QN	3.2	0	1.5	1.5	0.3	0.2	0.3	0	0	0	0	0	0	0	**0**	**0**	**-3.2**
QN	2.0	0.4	1.5	0.7	0.3	2.5	0.3	0	0	0	0	0	0	0	**0**	**0**	**-2.0**
Other AM	1.2	0.4	0.5	0.7	1.4	0.4	0.3	0	0.0	0.4	0	0.4	0	0.7	**0**	**-0.7**	**-1.2**
No AM prescribed	47.2	56.0	69.8	68.8	78.7	83.4	83.3	89.9	91.0	92.1	89.7	92.2	93.1	88.5	**93.6**	**+5.1**	**+46.4**
Any AM prescribed	52.8	44.0	30.2	31.2	21.3	16.6	16.7	10.1	9.0	7.9	10.3	7.8	6.9	11.5	**6.4**	**-5.1**	**-46.4**
Rx when test not done	**N=713**	**N=435**	**N=275**	**N=324**	**N=391**	**N=479**	**N=329**	**N=250**	**N=243**	**N= 216**	**N=203**	**N=207**	**N=159**	**N=243**	**N=174**		
AL	55.3	42.3	36.7	32.4	19.4	18.8	11.6	8.8	2.9	3.2	3.9	4.4	3.1	4.1	**0**	**-4.1**	**-55.3**
AL+QN	3.2	1.2	1.1	0.3	1.8	0.4	2.1	1.2	0	0	0	0	0	0	**0**	**0**	**-3.2**
SP	3.0	1.6	0.7	1.9	1.3	0	0	0	0	0	0	0.5	0	0	**0**	**0**	**-3.0**
QN	1.5	0.7	1.1	0.6	0.8	0	0.3	0	0.4	0	0	0	0	0	**0**	**0**	**-1.5**
Other AM	0.7	0	0.4	0.9	0.3	0	0	0	0.4	0	0	0	0.6	0	**0**	**0**	**-0.7**
No AM prescribed	36.3	54.3	60.0	63.9	76.5	80.8	86.0	90.0	96.3	96.8	96.1	95.2	96.2	95.9	**100**	**+4.1**	**+63.7**
Any AM prescribed	63.7	45.8	40.0	36.1	23.5	19.2	14.0	10.0	3.7	3.2	3.9	4.8	3.8	4.1	**0**	**-4.1**	**-63.7**

Figure 15: 2010-2018 national trends in health workers diagnostic and treatment adherence to national case management guidelines



While health workers' treatment adherence in relation to test positive and test negative results did not differ between high and low malaria risk areas and was largely optimal, major differences between risk areas were observed with respect to testing rates. Compared to low risk areas, febrile patents seen at high malaria risk areas were more commonly tested for malaria (86% vs 46%) and therefore more commonly managed according to test and treat guidelines as measured through the composite adherence indicator (83% vs 44%) (Figure 16).

Figure 16: Key test and treat adherence indicators stratified by malaria risk, Nov-Dec 2018



Highlight: Case-management policy performance and health workers adherence

KEY FINDINGS:

A) **The composite "test and treat" case-management performance - measured at all health facilities as an indicator of the policy performance - increased from 15.7% at the baseline to 50.9% at the last survey (35.2% improvement). The improvements of the individual "test and treat" case-management components between the baseline and last survey were as follows: 1) testing rates increased from 23.9% to 53.3% (29.4% improvement); 2) AL treatment for test positive patients increased from 82.7% to 98.5% (15.8% improvement), and 3) antimalarial treatment of test negative patients decreased from 52.1% to 6.7% (45.4% improvement).**

B) **The composite performance - measured at facilities with available malaria diagnostics and AL as an indicator of the health workers adherence increased from 28.1% at the baseline to 61.5% at the last survey (33.4% improvement). At these facilities, the changes in individual case-management components between the baseline and last survey were as follows: 1) testing rates increased from 42.5% to 64.3% (21.8% improvement), 2) treatment of test positive patients with AL increased from 83.3% to 98.4% (15.1% improvement), and 3) antimalarial treatment of test negative patients decreased from 52.8% to 6.4% (46.4% improvement).**

C) **Comparing the latest results with three preceding surveys a declining trend was observed in testing rates (64.3% to 58.6% to 53.3%) what also resulted in declining overall performance (58.8% to 53.9% to 50.9%). Both indicators were at the lowest level of performance since 2014. The last survey also showed that when diagnostics and AL are in stock, patients seen by health workers trained on malaria case-management were more commonly tested (68.2% vs 55.4%) and less commonly prescribed antimalarial for test negative results (2.8% vs 7.8%). The major differences during the last survey were however observed with respect to testing practices in relation to malaria risk. Compared to low risk areas, febrile patents in high malaria risk areas were more commonly tested for malaria (86% vs 46%) and also more commonly managed in accordance with malaria guidelines (83% vs 43%).**

IMPLICATIONS:

Despite improvements in malaria case-management practices compared to the baseline, the last three rounds showed declining trend in the overall performance primarily driven in large part by a decrease in testing rates. Relatively high levels of adherence to guidelines are however demonstrated in high malaria risk areas while major deficiencies do exist in low risk areas where additional programmatic interventions focusing on ensuring availability of malaria testing commodities and provision of supportive interventions are needed to optimize case-management.

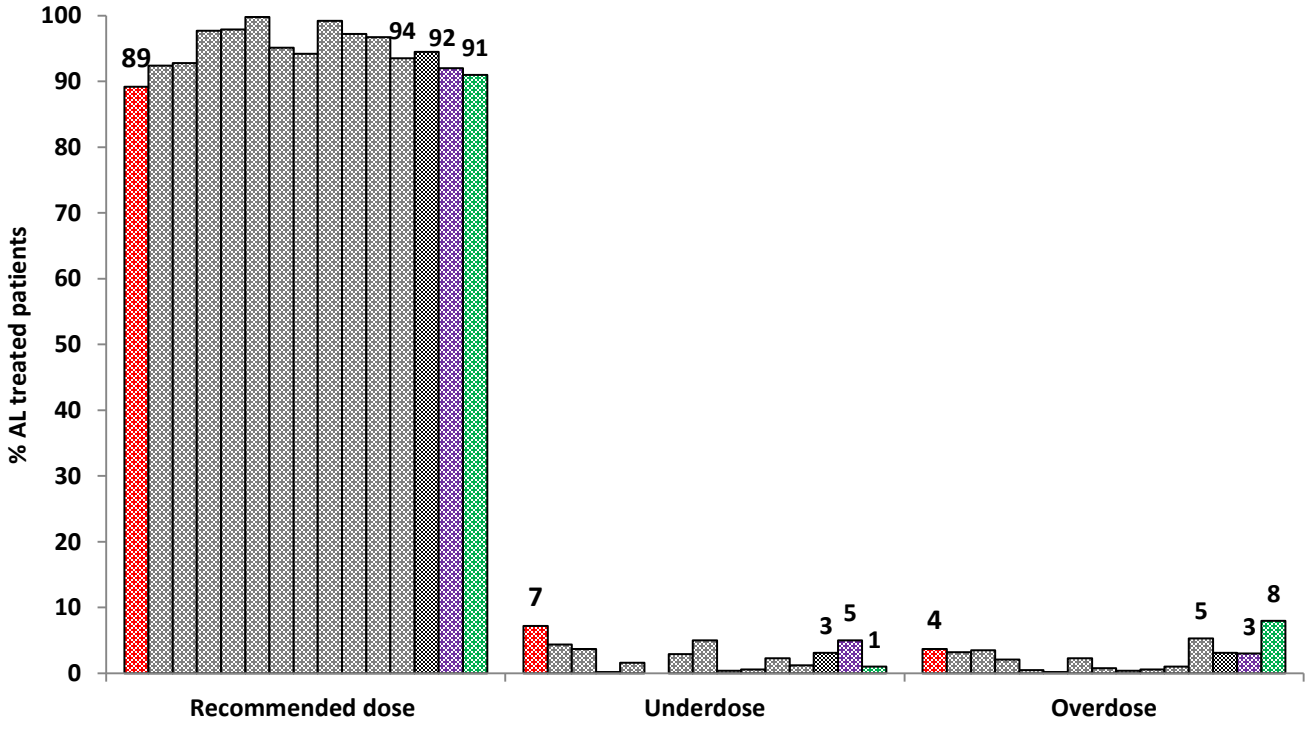
4.3.4. Correctness of AL dosing

The correctness of AL dosage prescriptions was measured in comparison with national guidelines dosage recommendations for four weight-specific AL categories (5-14kg; 15-24kg; 25-34kg and 35+kg). The prescriptions based on recommended number of tablets per weight group were classified as: 1) recommended, 2) overdosed, and 3) underdosed prescriptions. Overall, the weight based correctness of AL dosing was high throughout the monitoring period (survey range: 89.2% to 99.8%). At the last survey, 8 patients did not have doses recorded and of the remaining 154 AL prescribed patients 90.9% were correctly dosed for their weight (88.2% of children and 91.7% of patients 5 years and older) while underdosing and overdosing practices were respectively at 1.3% and 7.8% (Table 10 and Figure 17).

Table 10: Correctness of weight-specific AL dosing for patients who had AL prescribed

Correctness of dosing	Baseline N=1,328 (%)	FU 1 N=839 (%)	FU 2 N=569 (%)	FU 3 N=568 (%)	FU 4 N=428 (%)	FU 5 N=491 (%)	FU 6 N=385 (%)	FU 7 N=242 (%)	FU 8 N=262 (%)	FU 9 N=169 (%)	FU 10 N=305 (%)	FU 11 N=170 (%)	FU 12 N=164 (%)	FU 13 N=221 (%)	FU 14 N=154 (%)	% diff FU13 vs FU14	% diff B vs FU14
Recommended	89.2	92.4	92.8	97.7	97.9	99.8	95.1	94.2	99.2	98.8	96.7	93.5	94.5	92.3	**90.9**	**-2.3**	**+1.7**
Underdose	7.2	4.4	3.7	0.2	1.6	0.0	2.9	5.0	0.4	0.6	2.3	1.2	3.1	4.5	**1.3**	**-3.2**	**-5.9**
Overdose	3.7	3.2	3.5	2.1	0.5	0.2	2.3	0.8	0.4	0.6	1.0	5.3	2.4	3.2	**7.8**	**+5.8**	**+4.1**

Figure 17: 2010-2018 national trends in the correctness of health workers AL dosing



Highlight: Correctness of AL dosing

KEY FINDINGS:
The last survey found 91% of AL prescribed patients correctly dosed for their weight while incorrect dosing was uncommon, respectively at 2% and 8% below and above recommended dose.

IMPLICATIONS:
As a factor determining patients' adherence and treatment outcomes very low levels of prescriptions below recommended dose are positive findings and its monitoring should continue.

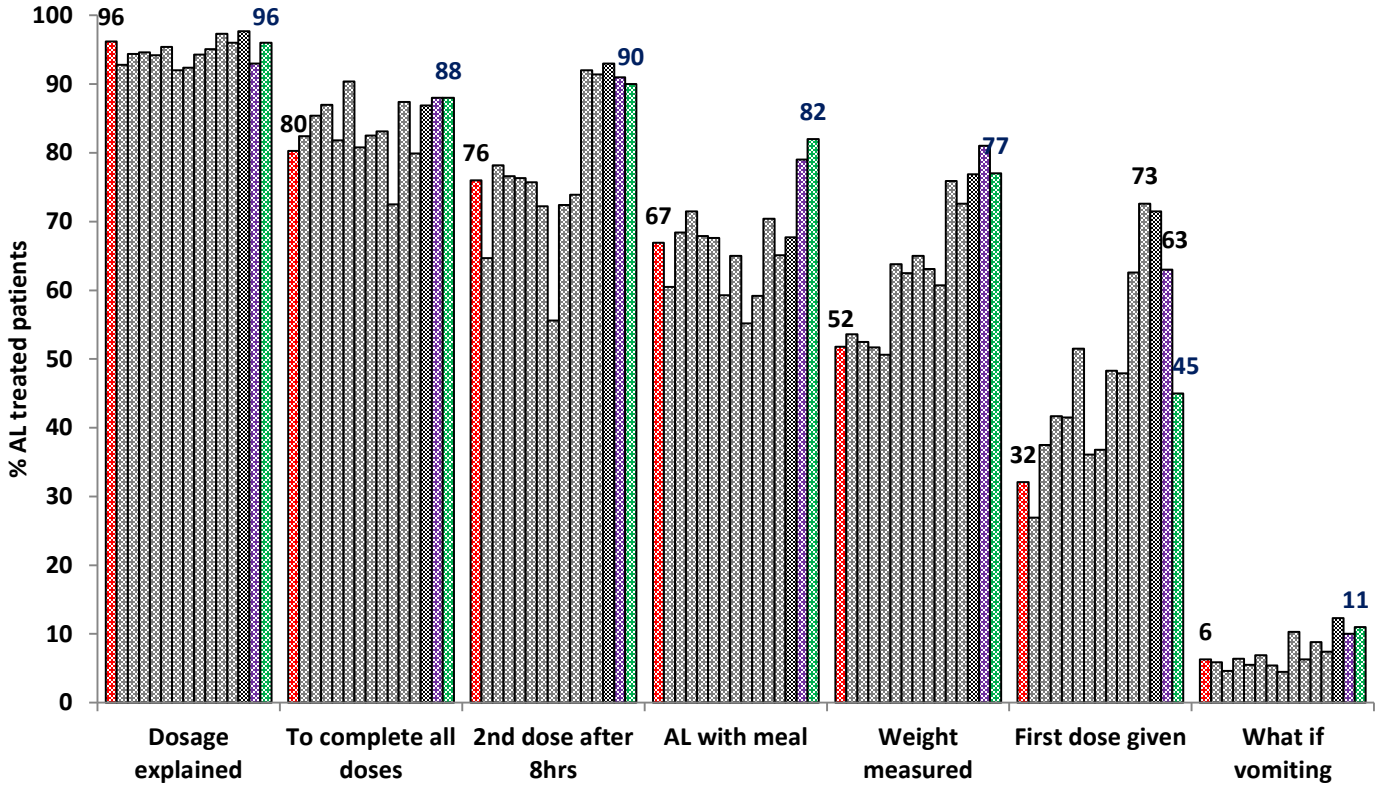
4.3.5. AL dispensing and counseling practices

The quality of AL dispensing and counseling was assessed for 7 performance tasks specified in the national malaria guidelines and training manuals (Table 11 and Figure 18). Comparing baseline with the last survey results, improvements were observed for the following 5 tasks: weighing of patients increased by 25.5% from 51.8% to 77.3%, administration of the first AL dose at the facility by 12.6%, from 32.1% to 44.7%, provision of advice on the second dose after 8 hours by 14.2%, from 76.0% to 90.2%, provision of advice to take AL after meal by 14.9%, from 66.9% to 81.8%, and finally, provision of advice to complete all AL dose increased by 7.6% from 80.3% to 87.9%. However, the latest survey found no improvements compared to the previous round in any of the tasks performed while in contrast, a declining trend in the administration of the first AL dose at the facility has continued over past 3 rounds (72% to 63% to 45%). Overall, of 7 tasks measured during the last survey, 5 were performed for more than three-quarters of AL treated patients while the remaining two tasks i.e. administration of the first AL dose at the facility and the provision of advice on what do in case of vomiting were less commonly done, respectively for 44.7% and only 11.4% of patients (Table 11 and Figure 18).

Table 11: Dispensing and counseling practices among patients who had AL dispensed

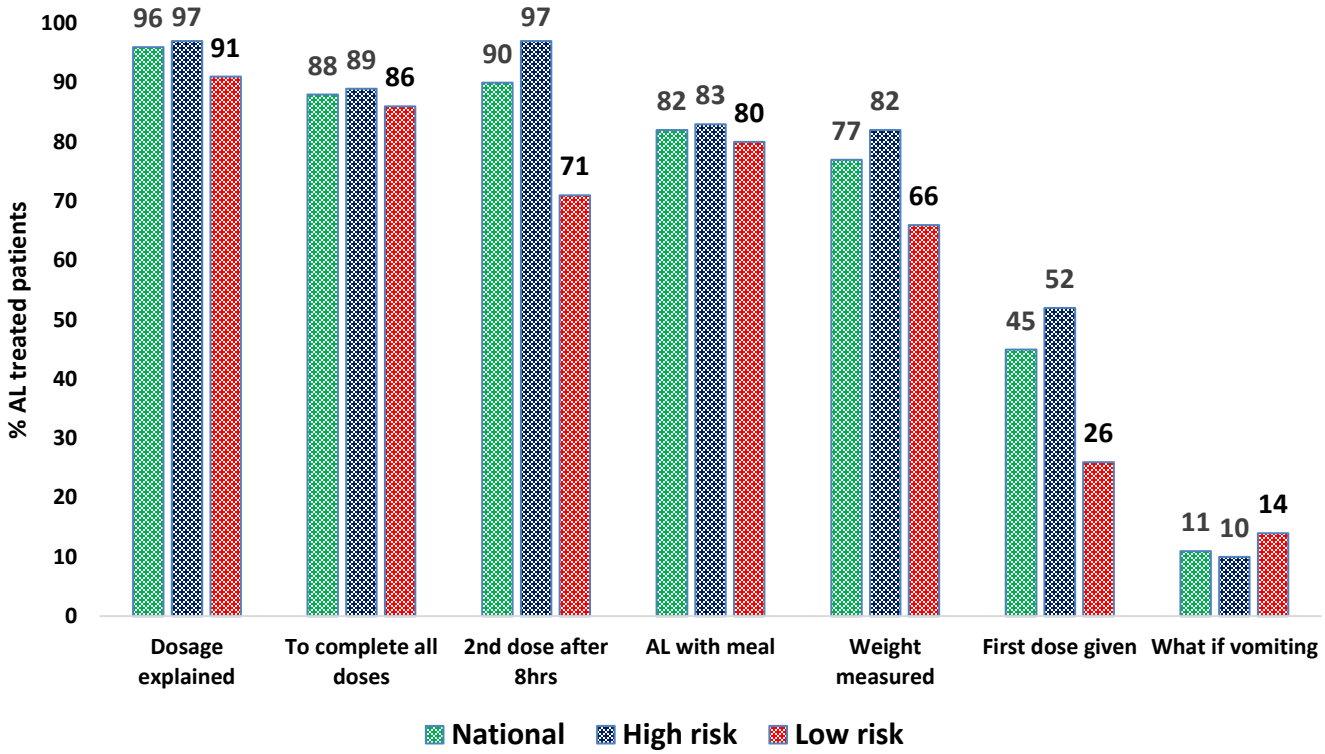
	Base N=1,408 (%)	FU 1 N=797 (%)	FU 2 N=478 (%)	FU 3 N=576 (%)	FU 4 N=417 (%)	FU 5 N=478 (%)	FU 6 N=332 (%)	FU 7 N=223 (%)	FU 8 N=261 (%)	FU 9 N=142 (%)	FU 10 N=262 (%)	FU 11 N=175 (%)	FU 12 N=130 (%)	FU 13 N=217 (%)	FU 14 N=132 (%)	% diff FU13 vs FU14	% diff B vs FU14
Weight measured	51.8	53.6	52.5	51.7	50.6	64.1	62.5	65.0	63.1	60.7	75.9	72.6	76.9	81.1	**77.3**	**-3.8**	**+25.5**
First dose given at facility	32.1	26.9	37.5	41.7	41.5	51.5	36.1	36.8	48.3	47.9	62.6	72.6	71.5	63.1	**44.7**	**-18.4**	**+12.6**
Dosage explained	96.2	92.8	94.4	94.6	94.2	95.4	92.0	92.4	94.3	95.1	97.3	96.0	97.7	93.1	**95.5**	**+2.4**	**-0.7**
To take 2nd dose after 8hr	76.0	64.7	78.2	76.6	76.3	75.7	72.2	55.6	72.4	73.9	92.0	91.4	93.0	91.2	**90.2**	**-1.0**	**+14.2**
To take drugs after meal	66.9	60.5	68.4	71.5	67.9	67.6	59.3	65.0	55.2	59.2	70.4	65.1	67.7	79.3	**81.8**	**+2.5**	**+14.9**
What to do if vomiting	6.3	5.9	4.6	6.4	5.5	6.9	5.4	4.5	10.3	6.3	8.8	7.4	12.3	9.7	**11.4**	**+1.7**	**+5.1**
To complete all doses	80.3	82.4	85.4	87.0	81.8	90.4	80.8	82.5	83.1	72.5	87.4	79.9	86.9	88.0	**87.9**	**-0.1**	**+7.6**

Figure 18: 2010-2018 national trends in health workers AL dispensing and counseling practices



Differences in AL dispensing and counselling practices were observed between high and low malaria risk areas. The performance of three dispensing and counselling tasks was significantly higher in high compared to low malaria risk areas: 1) administration of the first AL dose at the health facility (52% vs 26%), 2) weighing of patients (82% vs 66%), and 3) provision of advice on the second AL dose after 8 hours (97% vs 71%) (Figure 19).

Figure 19: Key AL dispensing and counseling practices stratified by malaria risk, Nov-Dec 2018



Highlight: AL dispensing and counseling practices

KEY FINDINGS:

Of 7 AL dispensing and counseling tasks assessed, the practice improvements compared to the baseline were observed for 5 tasks, specifically for patients weighing (+25%; 52% to 77%), administration of the first AL dose at facility (+13%; 32% to 45%), advising on the second dose after 8 hrs (+14%; 76% to 90%), advice to take AL after meal (+15%, 67% to 82%), and provision of advice to complete all AL doses (+8%, 80% to 88%). While at the latest survey 5 of 7 tasks were performed for more than three-quarters of AL treated patients, no improvements compared to the previous round were observed in any of the tasks performed. In contrast, a declining trend in the performance of the most important task - administration of the first AL dose at the facility - has continued over the past three rounds (72% to 63% to 45%). Patients in high risk areas were more commonly administered first AL dose at facility (52% vs 26%), weighed (82% vs 66%) and advised to take the second AL dose after 8 hours (97% vs 71%).

IMPLICATIONS:

Declining trends in administration of the first AL dose at the facility compromise prompt treatment and adherence to medications and should be urgently addressed during the upcoming trainings for health workers and routine supervisory visits with an additional focus on low malaria risk areas.

5. CONCLUSION AND RECOMMENDATIONS

The findings of fifteen survey rounds between 2010 and 2018 revealed that most of the key health systems and case-management indicators around “test and treat” policy for malaria have shown improvements compared to the baseline 2010 results. We have however observed negative trends during the recent rounds with respect to the availability of malaria diagnostics, artemether-lumefantrine, and case-management practices of which declining testing rates and administration of the first AL dose at the facility are of major concern. More positively, the health systems readiness and adherence to guidelines is relatively high in high malaria risk areas. However, the major readiness and practice gaps observed in low risk areas severely compromise aspirations towards universal case-management targets. To bridge these gaps, the current and future programmatic activities should focus on:

- Further investigations and resolution of RDT, AL (especially paediatric packs) and artesunate stock-outs in low malaria risk areas and maintenance of the supply chain across the country.
- Implementation of the second line treatment policy for malaria according to guidelines.
- Targeted in-service case-management trainings for front-line health workers across the country.
- Scale up of in-service trainings on malaria microscopy for laboratory workers and inclusion of laboratories into EQA schemes across the country and especially in low risk areas.
- Quantitative increase in the county level supportive supervision and qualitative improvements to include malaria case-management activities, consultation observations, and RDT use supervision.
- Distributions of the latest editions of guidelines and job-aids for health workers through in-service trainings, supervisory visits and commodity distributions.
- Supervision of the facility health workers to improve quality of the routine recording and reporting for malaria commodities.
- Across the country, and with special focus on low malaria risk areas, in-service case-management trainings and supervisory visits should emphasize and reinforce that: 1) all patients with febrile illness should be tested for malaria; 2) the first AL dose should be administered at facilities even in absence of food; 3) patients should be advised to return for replacement dose to complete full treatment course in case of vomiting; 4) IM artesunate is pre-referral treatment policy for severe malaria patients including pregnant women and 5) artesunate dosing schedule for children <20kg has changed from 2.4 mg/kg to 3mg/kg.
- Across the country, and with special focus on low malaria risk areas, in-service trainings and quality control visits of laboratory personnel should emphasize the following messages related to

malaria microscopy practice: 1) both thick and thin smears should be routinely prepared for malaria microscopy; 2) staining of blood smears using Giemsa solution and not Field stain; 3) parasite counts reporting based on counts per ml and not semi-quantitatively; and 4) all laboratories should have approved SOPs for malaria parasitology according to the guidelines.

- Biannual monitoring of the health systems readiness and the quality of outpatient malaria case-management should continue alongside implementation of the new Kenya Malaria Strategy.

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Annex 1: Summary of the progress in key health systems support indicators

Health systems support M&E indicators	2010 Rd 1	2010 Rd2	2011 Rd 3	2012 Rd 4	2012 Rd 5	2013 Rd 6	2014 Rd 7	2014 Rd 8	2015 Rd 9	2015 Rd 10	2016 Rd 11	2017 Rd 12	2017 Rd 13	2018 Rd 14	2018 Rd 15	Target (%)
% of facilities with AL in stock on survey day																
At least one AL pack	94.3	97.2	89.1	93.0	92.4	96.5	82.0	75.6	94.6	92.4	86.6	79.3	82.9	83.5	84.0	100
All AL packs	64.9	71.6	45.4	61.1	71.5	71.5	44.2	22.7	42.8	46.2	36.1	28.2	35.9	41.2	11.8	100
AL 6 pack	81.0	89.2	78.2	78.5	83.1	86.6	62.8	51.7	62.5	68.2	60.5	59.8	63.5	65.3	23.1	100
AL 12 pack	79.9	86.4	59.8	73.3	85.6	83.7	62.8	50.0	48.8	59.4	58.7	59.2	59.4	58.2	47.9	100
AL 18 pack	79.3	81.8	66.7	72.7	80.7	83.7	64.5	37.2	82.1	76.3	54.7	39.7	45.3	52.9	55.6	100
AL 24 pack	86.2	86.9	73.6	85.5	84.9	89.0	67.4	54.7	88.6	79.5	76.2	76.2	75.3	78.8	75.2	100
% of facilities with stock out of AL for 7 or more consecutive days in past 3 months																
All AL packs	27.2	21.0	6.3	9.4	21.5	7.0	19.9	24.4	29.2	12.3	13.5	24.1	20.7	20.0	34.3	0
One or more AL packs	59.5	52.3	44.8	39.0	45.4	21.6	56.1	72.7	74.4	53.8	61.0	72.4	59.8	65.9	82.8	0
AL 6 pack	37.6	30.1	19.5	21.1	27.9	15.2	36.3	52.9	46.4	40.4	39.6	42.0	36.7	42.4	76.9	0
AL 12 pack	43.9	32.4	31.6	28.7	34.9	14.6	39.2	45.4	60.7	45.6	44.6	42.0	39.1	44.7	58.0	0
AL 18 pack	52.0	42.1	27.6	29.8	39.0	17.0	38.6	60.5	50.9	22.2	37.3	64.9	50.9	56.8	54.4	0
AL 24 pack	39.3	35.2	19.5	19.9	34.3	10.5	36.3	38.4	44.6	21.1	20.7	36.2	31.4	27.7	34.3	0
% of facilities with malaria diagnostics on survey day																
RDT in stock	7.5	8.5	12.6	16.9	31.4	69.8	40.1	68.6	90.5	84.3	71.5	59.2	71.8	65.3	50.9	100
Any malaria diagnostic support (RDT or microscopy)	55.2	58.0	58.6	65.1	75.6	90.7	77.3	91.3	97.6	96.5	93.0	83.9	93.5	87.7	75.7	100
% of facilities without any malaria diagnostic support (RDT or microscopy) for 7 or more consecutive days in past 3mts	46.6	42.1	40.8	32.0	24.4	14.5	21.2	7.0	6.6	6.0	10.1	21.6	10.0	15.4	32.5	0
% of facilities having national malaria case-management guideline	0	5.7	47.7	45.3	56.7	58.1	46.8	64.5	61.7	72.1	75.9	64.0	74.9	70.0	52.4	100
% of HWs trained on new malaria case-management policy	0	21.5	24.9	27.7	26.2	50.2	44.6	56.6	51.7	60.6	67.4	67.0	69.2	64.5	63.4	100
% of HWs who had at least one supervisory visit in past 3m that included observation of malaria case-management	6.7	6.8	11.2	11.4	17.1	13.2	4.5	16.5	16.3	13.2	42.8	19.2	26.8	18.9	28.6	100
% of facilities which had at least one visit in past 3 months that included quality control of malaria microscopy	9.1	18.1	17.0	22.8	34.0	18.4	15.2	40.5	34.7	24.0	54.6	38.1	34.9	25.0	30.6	100
% of facilities which had at least one visit in past 3 months that included use of malaria RDTs	5.3	6.7	20.8	20.7	22.2	20.0	12.1	14.7	29.8	28.5	50.6	25.4	34.4	21.2	27.3	100

Annex 2: Summary of the progress in key malaria case-management indicators (overall and by age)

Malaria case-management M&E indicators	2010 Rd 1	2010 Rd2	2011 Rd 3	2012 Rd 4	2012 Rd 5	2013 Rd 6	2014 Rd 7	2014 Rd 8	2015 Rd 9	2015 Rd 10	2016 Rd 11	2017 Rd 12	2017 Rd 13	2018 Rd 14	2018 Rd 15
Overall performance of the new case-management policy - all HFs															
% of febrile patients managed according to national guidelines[a]	15.7 (11.8<5,18.9≥5)	22.1 (18.7<5,25.0≥5)	25.1 (21.5<5,27.9≥5)	28.4 (23.6<5,32.3≥5)	39.0 (37.8<5,39.9≥5)	49.9 (49.0<5,50.5≥5)	35.1 (28.9<5,40.2≥5)	55.6 (50.3<5,59.1≥5)	59.8 (52.0<5,65.8≥5)	59.9 (52.6<5, 66.1≥5)	59.4 (52.4<5 ,63.5≥5)	55.7 (47.8<5,60.8≥5)	58.8 (51.2<5,63.1≥5)	53.9 (43.8<5,60.2≥5	50.9 (46.9<5,53.0≥5
% of febrile patients who are tested with RDT or microscopy	23.9 (20.5<5,26.7≥5)	30.9 (25.6<5,35.5≥5)	36.8 (31.0<5,41.5≥5)	37.4 (31.5<5,42.3≥5)	46.8 (44.1<5,48.6≥5)	57.9 (55.2<5,59.7≥5)	43.0 (35.0<5,49.6≥5)	61.7 (56.6<5,65.2≥5)	66.0 (57.5<5,72.5≥5)	64.1 (55.5<5, 71.5≥5)	64.3 (58.2<5 ,68.0≥5)	59.5 (52.2<5,64.4≥5)	64.3 (54.7<5,69.7≥5)	58.6 (46.6<5,66.1≥5)	53.3 (47.4<5,56.6≥5)
% of febrile patients with positive test result who are treated with AL	82.7 (74.8<5,86.7≥5)	89.2 (90.9<5,88.2≥5)	69.8 (70.3<5,69.5≥5)	85.9 (84.1<5,86.9≥5)	91.6 (90.9<5,92.1≥5)	90.1 (94.4<5,87.6≥5)	77.4 (77.0<5,77.6≥5)	87.7 (87.7<5,87.8≥5)	91.0 (88.3<5,92.5≥5)	98.6 (96.4<5,100≥5)	96.9 (90.8<5 ,99.5≥5)	96.5 (93.3<5,98.2≥5)	88.8 (91.1<5,87.9≥5)	96.9 (94.2<5,97.9≥5)	98.5 (100<5,98.0≥5)
% of febrile patients with negative test result not treated for malaria	47.9 (43.3<5,51.3≥5)	55.5 (58.3<5,53.5≥5)	69.8 (68.7<5,70.6≥5)	69.2 (69.3<5,69.1≥5)	79.9 (83.7<5,77.4≥5)	83.5 (85.1<5,82.4≥5)	73.1 (74.5<5,72.0≥5)	91.1 (89.2<5,92.5≥5)	91.7 (93.4<5,90.5≥5)	92.6 (95.0<5,91.0≥5)	90.8 (92.2<5 ,90.0≥5)	91.7 (90.6<5,92.3≥5)	93.6 (95.5<5,92.7≥5)	88.7 (93.9<5,86.0≥5)	93.3 (98.6<5,90.4≥5)
Health workers adherence to guidelines – facilities where malaria diagnostics and AL are available															
% of febrile patients managed according to national guidelines[a]	28.1 (19.3<5,36.1≥5)	34.6 (29.0<5,41.7≥5)	40.2 (32.6<5,47.2≥5)	44.3 (37.9<5,49.3≥5)	47.8 (44.9<5,49.8≥5)	54.5 (52.5<5,56.0≥5)	47.3 (39.0<5,54.3≥5)	59.8 (54.5<5,63.3≥5)	62.0 (55.4<5,67.1≥5)	61.2 (52.6<5,68.5≥5)	64.7 (59.0<5 ,67.7≥5)	62.4 (55.2<5,66.8≥5)	62.2 (52.7<5,67.7≥5)	60.3 (53.0<5,64.4≥5	61.5 (58.6<5,63.1≥5
% of febrile patients who are tested with RDT or microscopy	42.5 (33.3<5,50.8≥5)	49.5 (38.8<5,59.6≥5)	56.9 (46.8<5,66.4≥5)	57.8 (50.6<5,63.6≥5)	57.5 (52.2<5,61.2≥5)	63.2 (59.0<5,66.3≥5)	54.7 (47.3<5,65.6≥5)	67.2 (62.2<5,70.4≥5)	68.5 (61.0<5,74.3≥5)	65.7 (55.7<5,74.1≥5)	69.9 (63.7<5 ,73.2≥5)	66.3 (60.3<5,69.9≥5)	68.2 (56.5<5,75.0≥5)	65.6 (55.8<5,71.0≥5)	64.3 (59.2<5,67.2≥5)
% of febrile patients with positive test result who are treated with AL	83.3 (75.3<5,87.4≥5)	89.6 (91.8<5,88.3≥5)	75.3 (71.9<5,77.3≥5)	88.6 (85.5<5,90.3≥5)	93.2 (93.1<5,93.3≥5)	90.3 (95.2<5,87.4≥5)	83.2 (80.0<5,85.1≥5)	87.5 (88.4<5,87.1≥5)	91.1 (89.0<5,92.2≥5)	98.5 (96.0<5,100≥5)	99.1 (98.3<5 ,99.4≥5)	97.4 (94.3<5,99.0≥5)	88.8 (90.5<5,88.2≥5)	96.9 (94.1<5,97.9≥5)	98.4 (100<5,97.8≥5)
% of febrile patients with negative test result not treated for malaria	47.2 (42.3<5,50.7≥5)	56.0 (61.1<5,52.6≥5)	69.8 (67.1<5,71.7≥5)	68.8 (69.1<5,68.6≥5)	78.7 (83.1<5,75.9≥5)	83.4 (84.9<5,82.4≥5)	84.7 (84.9<5,84.5≥5)	89.9 (87.3<5,91.7≥5)	91.0 (92.9<5,89.7≥5)	92.1 (94.6<5,90.5≥5)	89.7 (91.1<5 ,88.9≥5)	92.2 (89.8<5,93.5≥5)	93.1 (95.2<5,92.1≥5)	88.5 (95.5<5,85.1≥5)	93.6 (98.5<5,90.8≥5)
Quality of AL prescribing, dispensing and counseling – febrile patients with AL prescribed and dispensed															
% of patients with AL prescribed in recommended weight-specific dose	89.2 (88.7<5,89.6≥5)	92.4 (93.8<5,91.3≥5)	92.8 (93.4<5,92.3≥5)	97.7 (99.1<5,96.7≥5)	97.9 (99.4<5,97.0≥5)	99.8 (99.5<5,100≥5)	91.4 (89.1<5,93.2≥5)	94.2 (92.7<5,94.8≥5)	99.2 (97.7<5,100≥5)	97.2 (95.9<5,97.9≥5)	96.7 (96.6<5 ,96.8≥5)	93.5 (98.1<5,91.5≥5)	94.5 (89.1<5,96.6≥5)	92.3 (87.0<5,94.0≥5	90.9 (88.2<5,91.7≥5
% of patients with AL dispensed who had weight measured	51.8 (60.0<5,45.1≥5)	53.6 (71.4<5,39.4≥5)	52.5 (57.3<5,50.8≥5)	51.7 (58.6<5,46.9≥5)	50.6 (56.7<5,46.9≥5)	64.1 (75.7<5,57.2≥5)	62.7 (71.8<5,55.5≥5)	65.0 (67.6<5,63.8≥5)	63.1 (76.7<5,55.9≥5)	60.7 (73.5<5, 53.8≥5)	75.9 (78.4<5 ,74.9≥5)	72.6 (63.9<5,77.2≥5)	76.9 (79.0<5,76.1≥5)	81.1 (86.8<5,79.3≥5)	77.3 (100<5,70.6≥5)
% of patients with AL dispensed who had first dose given at facility	32.1 (35.7<5,29.2≥5)	26.9 (29.3<5,24.9≥5)	37.5 (31.0<5,42.2≥5)	41.7 (42.7<5,41.0≥5)	41.5 (46.5<5,38.5≥5)	51.5 (53.7<5,50.2≥5)	36.1 (32.9<5,38.5≥5)	36.8 (42.3<5,34.2≥5)	48.3 (45.6<5,49.7≥5)	47.9 (46.9<5,48.4≥5)	62.6 (62.2<5 ,62.8≥5)	72.6 (80.3<5,68.4≥5)	71.5 (73.7<5,70.7≥5)	63.1 (64.2<5,62.8≥5)	44.7 (76.7<5,42.9≥5)
% of patients with AL dispensed who were explained on dosing	96.2 (96.2<5,96.1≥5)	92.9 (92.4<5,93.2≥5)	94.4 (93.2<5,95.3≥5)	94.6 (95.0<5,94.4≥5)	94.2 (94.3<5,94.2≥5)	95.4 (94.9<5,95.7≥5)	92.0 (93.3<5,91.0≥5)	92.4 (88.7<5,94.1≥5)	94.3 (94.4<5,94.2≥5)	95.1 (98.0<5,93.6≥5)	97.3 (96.0<5 ,97.9≥5)	96.0 (93.4<5,97.4≥5)	97.7 (100<5,96.7≥5)	93.1 (92.5<5,93.3≥5)	95.5 (96.7<5,95.1≥5)
% of patients with AL dispensed who were advised on vomiting	6.3 (7.8<5,5.0≥5)	5.9 (6.5<5,5.4≥5)	4.6 (5.0<5,4.4≥5)	6.4 (7.5<5,5.6≥5)	5.5 (10.2<5,2.7≥5)	6.9 (7.3<5,6.6≥5)	5.4 (6.7<5,4.5≥5)	4.5 (7.0<5,3.3≥5)	10.3 (16.7<5,7.0≥5)	6.3 (8.2<5,5.4≥5)	8.8 (5.4<5 ,10.1≥5)	7.4 (4.9<5,8.8≥5)	12.3 (10.5<5,13.0≥5)	9.7 (7.6<5,10.4≥5	11.4 (16.7<5,9.8≥5

[a] Tested for malaria AND only test positives treated with AL