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ASSESSMENT OF HEALTH FACILITY ACCESS TO CARE, SURVEILLANCE AND RESPONSE READINESS AND READINESS SCORE FOR MALARIA ELIMINATION IN FOUR COUNTIES, KENYA, 2023

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ABSTRACT

***Objectives*: To determine capacity for; surveillance and response; access to care and readiness score for malaria elimination implementation amongst the sampled health facilities.**

***Design*: A retrospective cross-sectional study that used routinely collected Malaria program data using a District-Level Readiness for Elimination of Malaria Tool (DREAM-IT) tool, adopted by the Ministry of Health and modified to fit the country's context.**

***Settings*: Four malaria elimination target counties in Kenya namely; Kirinyaga, Nyandarua, Laikipia and Nyeri.**

***Subject*: Healthcare workers in twenty-four sampled health facilities offering outpatient and inpatient malaria services across all levels of care.**

Interventions: Implementation of malaria elimination strategy in Kenya.

***Main outcome measures*: Health facility readiness and score in Access to care (Case management), Surveillance and response for malaria elimination implementation.**

Results: **Most of the study health facilities were government- owned (public) and level 2. Kirinyaga recorded the best performance in case management. Surveillance and response was performed over 50% in Kirinyaga and Nyandarua, and was poorly performed in less than 40% in Nyeri and Laikipia.**
Conclusion: **In elimination settings, a case-based surveillance system with increased sensitivity and specificity as part of broader strengthening of the passive surveillance systems is key. High-quality and prompt case management that allows testing and treatment of all suspected and confirmed malaria cases respectively should be put in place to reduce transmission, especially in lower-level health facilities where majority of people seek care. More investments in health systems in readiness for malaria elimination implementation in Kenya is required.**

INTRODUCTION

Malaria remains a public health problem in Kenya despite several concerted control efforts. Malaria transmission in Kenya is heterogeneous and is influenced by a number of factors, including altitude, rainfall, temperature, proximity to water bodies, urbanisation, and agricultural practices. Based on these factors, five malaria epidemiological zones namely: lake endemic, coastal endemic, highland epidemic, seasonal transmission, and low-risk zones. Endemic zones include areas of stable malaria with altitudes ranging from 0 to 1,300 meters. The low-risk seasonal transmission occurs in arid and semi-arid areas of northern and southern parts of Kenya. For the highlands, epidemics occur when climatic conditions favour minimum temperatures that sustain vector breeding (1).There has been sustained collaborative effort to reduce the burden of malaria in the country through multi-pronged approaches and strategies. The interventions scaled up at the programmatic level to roll back the malaria burden include targeted distribution of long-lasting insecticidal nets, intermittent preventive treatment in pregnancy, and timely diagnosis and treatment of malaria cases (1).

In elimination settings, surveillance is useful for early detection of malaria infections to prevent onward transmission; enable determination of the most likely location of infection; and facilitate identification, investigation, and elimination of foci of continuing transmission. Surveillance systems should be more sensitive and specific to allow identification of all malaria cases. Case detection can be either passive or active, but recording should be done using individual case forms. Cases are reported immediately (within 24 hours), and enough details collected to enable classification into indigenous, introduced, imported, relapse, or recrudescent. Response is conducted at the household and focus level, with case investigations required within 24 to 48 hours and focus investigations within one week (2).
Malaria treated case management in elimination settings may be considered asymptomatic reservoirs in the malaria transmission cycle and thus patient follow up is important in not only preventing complications and death but also averting onward transmission, reducing parasite reservoir, and preventing relapse of malaria (3).
In 2018, Kenya conducted a Malaria Programme Review, and among the key

recommendations was the inclusion of an objective on establishing systems for malaria elimination in selected counties with very low risk of malaria transmission. This is aligned with the strategic vision of "A Malaria-free Kenya" of the KMS (2019-2023) (1).

The strategy introduced the malaria elimination objective targeting areas that reported near-zero malaria transmission from 2012 to 2017. The prioritised strategies include: Establish structures and capacity at the national and county levels to coordinate and drive the implementation of the elimination agenda; develop capacity for malaria elimination; establish active case detection, notification, investigation, and response systems for elimination in targeted counties; strengthen quality assurance for diagnosis, treatment, and entomology to enhance surveillance and strengthen communication and advocacy for malaria Elimination (1) The malaria elimination targeted Counties include: Nyeri, Nyandarua, Laikipia and Kirinyaga. The selection of these counties was based on low malaria incidence, prevalence, data quality, and accessibility. (1)

Since malaria elimination entails the interruption of local transmission (reduction to zero incidence of indigenous cases) of a specified malaria parasite species in a defined geographical area as a result of deliberate activities thus, continued measures to prevent re-establishment of transmission are required(4) .The aim of the of health facility baseline assessment was to check the access to care, surveillance and response readiness for malaria elimination implementation and subsequently determine the readiness score for each of the four target counties, Kenya.

METHODS

Study design

The current study was a retrospective descriptive cross-sectional study using routinely collected program data, based on a targeted sample health facility assessment of access to care (case management), surveillance and response across all levels of care in both public, private including Faith Based Organization (FBO) facilities in the four-malaria elimination targeted counties.

Study Site

The study utilised routine data set in a database, previously collected from a total of 24 health facilities randomly sampled in targeted four counties located in the low-risk epidemiological zone for malaria elimination based on level of care and ownership as shown in Figure1. Three- point criteria had been used to select counties for malaria elimination; Annual Parasite Incidence (<5 per 1000), Malaria Test Positivity Rate (<5 percent) and reporting completeness of above 90% for a period of 5 years retrospectively. For ease of implementation the malaria elimination counties had to form one contiguous block, thus far-flung counties meeting the selection criteria such as Wajir and Makueni were left out.

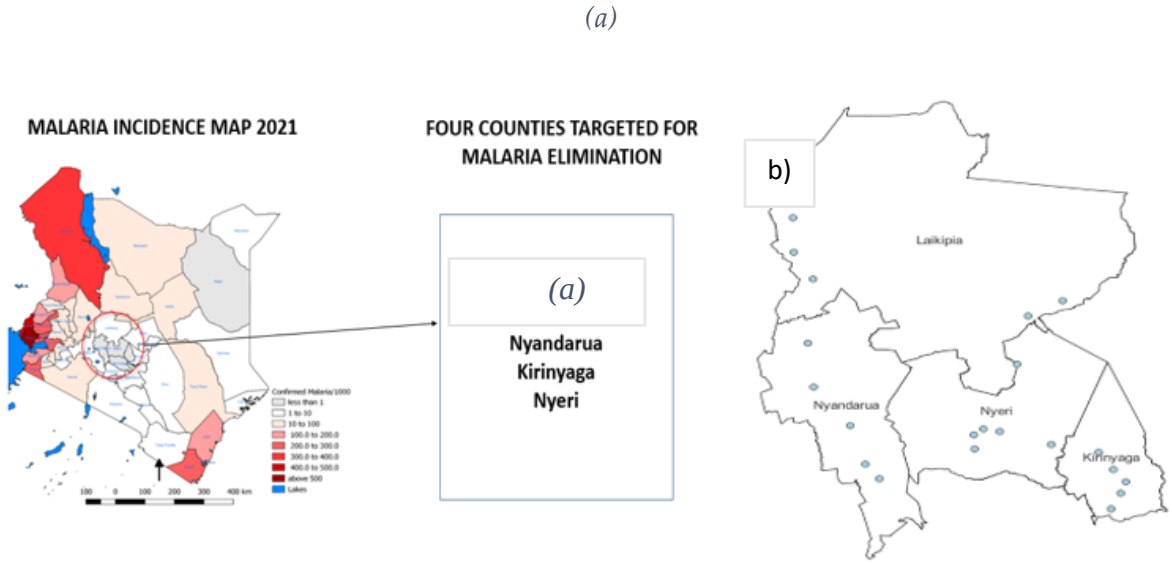

Figure 1: (a)Map showing location the study sites (four malaria elimination target counties) within Kenya, (b) Inset map showing the study sites (four malaria elimination target counties) and the distribution health facilities accessed (Source: Kenya Health Information System KHIS).

Study population and Sampling

The study population was sampled health facilities offering both outpatient and inpatient malaria services in the four malaria elimination target counties across all levels of care. A total of 24 health facilities randomly sampled based on level of care and ownership was assessed. The 24 sampled facilities included four level 5 county referall hospitals, four level 4 hospitals, four level 3 health facilities, four level 2 health facilities, four faith based level 4 facilities and four high volume private health facilities.

Data variables

To assess the capacity frame, anfacility access to care (case management), surveillance and response readiness for malaria elimination implementation in the four malaria elimination target counties, the variables collected included the availability of health facilities with; current reporting tools, an Integrated Disease Surveillance and Response (IDSR) focal person, functional laptop for reporting to the KHIS, reporting guidelines/Standard Operating Procedures (SOPs), staff trained on data analysis and management, any staff trained in malaria surveillance or IDSR, Community Health Volunteers (CHVs) in the catchment area reporting malaria cases within the recommended 24hrs time frame, an available soft /hard copy of the current national malaria diagnosis and treatment (2020) guidelines, a linked community health unit, availability that perform diagnostic tests on all suspected malaria cases as per guidelines, that participate in External Quality Assurance (EQA)program and perform Internal Quality Control (IQC).

Data Collection Procedures

The malaria surveillance system relies on the existing Health Information System (HIS) platforms of reporting service data, commodity management data, and surveillance data. Malaria data are collected in both the weekly integrated disease

surveillance reporting platform and the monthly HIS platform. All health facilities within the counties are expected to report on both platforms. All patients seeking treatment in health facilities in Kenya have their data on case management captured in registers and daily summaries generated. The data are submitted to the reporting platforms on weekly or monthly using the paper-based summaries at the facility level. These summaries are then submitted to the sub-county office for data entry onto the web-based Kenya Health Information System (KHIS).

Secondary data was abstracted from the health facility assessment that was done in 2023 undertaken as part of routine survey for Division of National Malaria Programme. Key informant interviews conducted among health care workers in selected health facilities using structured checklists adapted from the District-level Readiness for Elimination of Malaria Tool (DREAM-IT). DREAM-IT is a malaria elimination-focused operational assessment tool designed to systematically and comprehensively evaluate the operational readiness of all levels of the health system for malaria elimination. A unique checklist was used for each level of health service delivery, but the general structure of the checklist was similar. The checklist for the health facility assessment covered 10 thematic areas.

1. General Information
2. Office Infrastructure
3. Training
4. Supervision
5. Vector Control
6. Access to Care
7. Human Resources
8. Supply Chain
9. Surveillance and Response
10. Community Engagement

Box1: Ten thematic areas of health facility checklist (DREAM- IT)

For the purpose of this study abstraction of data from the surveillance and response and access to care (case management) was done. Access to care specifically have addressed availability of attributes relating to malaria case management at health facilities in the counties.

Data analysis, management and readiness score

Quantitative data was extracted from the source database (ODK app) and uploaded to MS Excel software version 22.0. The analysis was performed using Stata v. 14 Stata Corp., LP, College Station, TX, USA). The analysis of indicators was undertaken at health facility level. Descriptive analysis was conducted on various study variables frequencies and proportions. The outputs of statistical analysis were presented as narratives, tables and figures. Health system malaria elimination readiness score was calculated at the two domain levels surveillance and response and Access to care (case management in the thematic areas) for the health facility assessment. Each question was assigned one point and the average score calculated out of the total number of questions for each domain.

A total of 17 questions were considered as shown in Supplementary File 1.

Ethics approval

Ethical clearance was obtained from the Maseno University Scientific and Ethics Review Committee (approval number MUSERC/01234/23). Permission to use the assessment data sought from the National Malaria Control Program (NMCP). Personal identifying information was omitted from the data collection tools to ensure patient confidentiality.

RESULTS

There were 696 health facilities in the four counties as per the report by the 21 sub-county teams Majority of the facilities were Government of Kenya (GoK) owned. Of the 24 facilities sampled, 90% were level 2. About half of these facilities provided malaria laboratory services and 65% of levels 3, 4, 5, and 6 provided inpatient services. Malaria laboratory services ranged from 37- 67% which is suboptimal for access to care (Table1).

Table 1

Number of health facilities in the four malaria elimination counties by ownership and level of care

Description	Kirinyaga	Laikipia	Nyandarua	Nyeri	Total
Total number of health facilities	147	151	145	253	696
Health facility ownership GoK	70	89	87	129	375
FBO	17	12	10	11	50
Private	60	50	48	113	271
Health facility level Level 2	90	122	111	212	535
Level 3	43	17	30	31	121
Level 4	13	10	3	8	34
Level 5	1	2	1	1	5
Level 6	0	0	0	1	1
Inpatient services (%)	70%	62%	65%	63%	65%
malaria laboratory services (%)	63%	51%	37%	46%	49%

Key

GoK	*Government of Kenya*
FBO	*Faith Based Organization*

At the health facility level, 16(67%) reported having sufficient and current HIS reporting tools and this varied across with 87% in Laikipia and Kirinyaga, 67% in Nyeri and extremely low in Nyandarua (33%). In Laikipia and Kirinyaga the focal IDSR persons were available. Gaps were noted in Nyandarua (83%) and Nyeri (50%). 10 (42%) had a health care worker trained in malaria surveillance or IDSR. All the health facilities sampled in Laikipia, and Kirinyaga Counties had an IDSR focal person compared to 5(83%) and 3(50%) in Nyandarua and Nyeri Counties. Training of the IDSR was reported highest in Nyandarua (83%), followed by Kirinyaga (50%) and decimally done in Nyeri and Laikipia at less than 20%. Access to functional laptop was available 50% and lowest in Laikipia at 17%. Reporting guidelines or SOPs were available on average (67%) Reporting of malaria cases

within the recommended 24 hours by community health volunteers was hardly done in all the four counties. Thirteen (54%) health facilities had staff trained in data analysis and management and this varied across counties, being lowest in Laikipia (33%) Hot spots and population most at risk was known by less than 50%, worse in Kirinyaga and Laikipia in Eleven (46%)health facilities knew which populations or areas were at higher risk for malaria. These populations were identified by observing patterns in routine surveillance data, case investigations and information provided by community health volunteers.

Table 2

Sampled health facilities capacity for surveillance and response by county

Description Health Facilities with	Nyandarua (N=6) n(%)	Laikipia (N=6) n(%)	Kirinyaga (N=6) n(%)	Nyeri (N=6) n(%)	Overall (N=24) n(%)
Sufficient and current HIS reporting tools	2 (33)	5 (83)	5 (83)	4 (67)	16 (67)
IDSR focal person	5 (83)	6 (100)	6 (100)	3 (50)	20 (83)
Health worker trained in malaria surveillance or IDSR	5 (83)	1 (17)	3 (50)	1 (17)	10 (42)
Functional laptop or computer for reporting to the KHIS	4 (67)	1 (17)	3 (50)	4 (67)	12 (50)
Reporting guidelines or standard operating procedures	4 (67)	3 (50)	5 (83)	4 (67)	16 (67)
Community health volunteers report malaria cases within the recommended 24 hours					
Never	2 (33)	4 (67)	4 (67)	2 (33)	12 (50)
Rarely	2 (33)	0 (0)	0 (0)	1 (17)	3 (13)
Not applicable	2 (33)	2 (33)	2 (33)	3 (50)	9 (38)
Staff trained in data analysis and management	4 (67)	2 (33)	4 (67)	3 (50)	13 (54)
Staff know which populations and areas are at highest risk for malaria	4 (67)	3 (50)	2 (33)	2 (33)	11 (46)

Key
HIS- Health Information System
KHIS- Kenya Health Information System
IDSR- Integrated Disease Surveillance and Response

All the 24 health facilities reported that they performed diagnostic tests for all cases of suspected malaria. Thirteen (54%) were using microscopy only while the remaining 11 (46%) were using both microscopy and malaria rapid diagnostic tests (mRDT) (Figure 6). Health facilities using both mRDT and microscopy were fewer in Laikipia, and Nyeri Counties compared to Kirinyaga County as shown in Appendix 2.

The quality assurance implementation plan guides execution of external quality assurance (EQA) activity at national, county, and sub-county levels. Malaria EQA involves three

programs, namely: slide rechecking, proficiency testing, and technical support supervision and mentorship that measure the competency of health facility and individual laboratory officers. It is recommended that all facilities in elimination counties enrol in at least one of the three EQA programs. At the sub-county level, 16 (76%) assessed sub-counties conducted technical support supervision, 15 (71%) and six (29%) participated in slide rechecking and proficiency testing, respectively. Some of the sampled facilities in three of the sub-counties (Kirinyaga East, Mwea West, and Tetu) had not been enrolled in any of the EQA programs. At health facility level, 83% of the health facilities participated in EQA programs and 88% of the sampled facilities were reported to be participating IQC which requires availability of positive and negative malaria slides during staining of blood films respectively (Figure 2).

Malaria diagnostics are available optimally (100%). Quality assuarance internal and external was conducted over 80%. In 71 % functional Community Health Units (CHUs) linked to health facilities. Diagnostics by microscopy was sub optimal done (70%). Availability of current malaria diagnosis and treatment guidelines was low (33%); lowest in Nyandarua (17%) and highest in Laikipia County (50%) (Appendix 2). Patient follow up after administration of *Plasmodium falciparum* treatment is happening in 25% and integrated Community Case Management (iCCM) is hardly done (Figure 2).

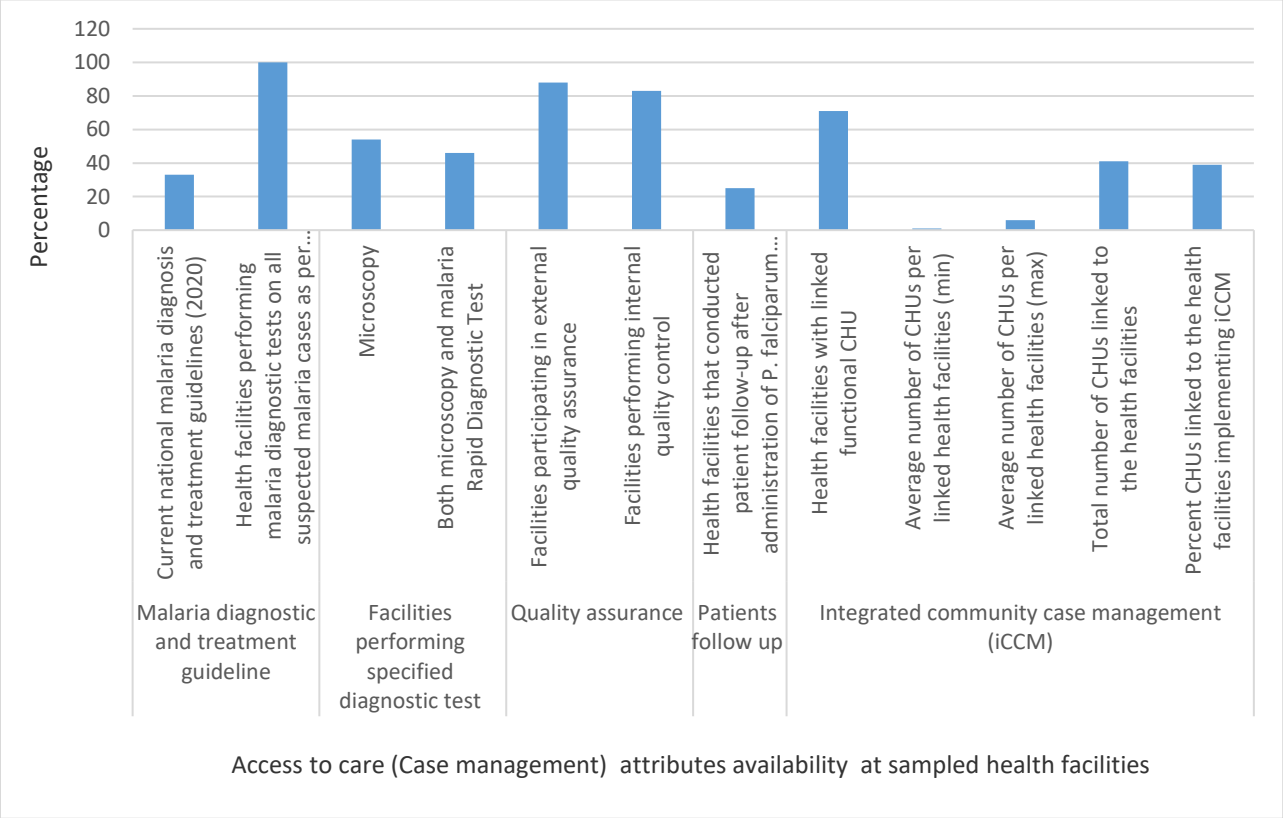

Figure 2: Average sampled health facilities capacity for Access to care (Case management) in the four elimination target counties, Kenya

Health facility Technical and Operational Readiness Score

The best performance in case management was recorded in Kirinyaga. The rest performed over 60%. Surveillance and response was performed over 50% in Kirinyaga and Nyandarua, however this was poorly performed in less than 40% in Nyeri and Laikipia.

Table 3

Health facility scores on access to care, surveillance and response technical and operational readiness for malaria elimination implementation.

COUNTY	CASE MANAGEMENT ASPECTS (%)	SURVEILLANCE AND RESPONSE (%)
Kirinyaga	73	53
Laikipia	64	39
Nyandarua	63	53
Nyeri	65	39

DISCUSSION

The study aimed to assess capacity of the health facilities in malaria elimination target counties to implement malaria elimination strategies in access to care (case management), surveillance and response, Kenya 2023.There was notable findings of poor surveillance and response below 50% in Laikipia and Nyeri County. Though there were IDSR focal persons in the majority of facilities, they lacked training on malaria surveillance or IDSR and Suboptimal capacity on data management and upload to KHIS. There were concerted efforts in case-based reporting within 24 hours

Surveillance activities are essential to achieving malaria elimination, however the utility of surveillance data depends on how quickly it is collected, analysed, and used to action a response.

In case management most facilities were public health, GOK owned and level 2. Laboratory services were suboptimal but the diagnostic test were principally through microscopy, the gold standard of care. Quality assurance was conducted both external and internal but there was a gap in participation in proficiency testing. Diagnosis and treatment Guidelines availability, patient follow up and integrated community case management was poor. Community health coverage was also noted sub-optimal.

Malaria elimination programmes are highly affected by social and behavioural factors, based traditional beliefs and social norms that may impact certain community groups' access to prevention and treatment services. Case management availability at level 2 in the GOK public sector needs to be promoted as it addresses favourable reduction of health inequities promoting primary health coverage and moves the nation towards universal access (5)

Quality assurance was conducted both external and internal but there was a gap in participation in proficiency testing (PT), which is a national independent assessment scheme that checks competencies in testing and reporting of malaria results and is conducted in two levels; Proficiency testing for facility and Individual. The assessment covers three key areas; parasite detection, speciation and quantification. This is comparable to Zambia that undertook improvement in their quality assurance through outreach training and supportive supervision (OTSS) in enrolled

health facilities addressing malaria diagnostic skills, adoption of laboratory best practices and strengthening of case management practices (3)

Efforts in case-based reporting accolades as it is complying with the 1, 3, 7 approach that includes case notification within 24 hours, case investigation for classification within 3 days and foci investigation and targeted response in 7 days (6)

Community Case Management for malaria (CCMm) is not prioritized in low-risk areas thereby lacking in training and with inadequate implementation of integrated community case management (iCCM). The iCCM platform provides an opportunity for implementation of malaria and other childhood illnesses by community health promoters to advance participation in malaria elimination efforts.

CONCLUSION

In elimination settings, it is important to have an effective case-based surveillance system with increased sensitivity and specificity as part of broader strengthening of the passive surveillance systems. High-quality and timely case management that allows testing and treatment of all suspected and confirmed malaria cases respectively should be in place to reduce transmission, especially in level two health facilities where majority of malaria cases seek care. From the findings, though sub optimal, there exists some access to care, surveillance and response structures and systems upon which implementation of malaria elimination activities can be founded However, more attention needs to be given to resilience of the health system readiness for malaria elimination implementation in Kenya with particular focus to leadership and clinical governance. Kirinyaga county was more ready in terms of access to care and surveillance and response, followed by Nyandarua. Nyeri and for implementation of malaria elimination. The sample size assessed was less than 5% of the health facilities, thus a subsequent survey needs to increase the sampling data. Currently, case-based surveillance reporting system is not deployed in the country, investment in this aspect within the malaria program for the elimination counties is key.

RECOMMENDATIONS

Malaria elimination is an enormous undertaking requiring detailed planning, advocacy and mobilization of resources to establish requisite systems, sustain the gains made and prevent re- establishment. It shall encompass an intense case-based surveillance, significant political goodwill, sufficient budget, skilled human resource, strong leadership and effective coordination. Since malaria disease in the elimination target counties has not been considered as a priority public health concern, a lot of advocacy and lobbying will be required to ensure a buy in by all stakeholders to prioritize, allocate adequate resources and participate in malaria elimination activities.

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Appendix 1: *Domains and questions included in the malaria elimination readiness score*

Health facility level Access to care (number of questions – 11)	HF performing malaria diagnostic tests (mRDT or microscopy) on all suspected cases of malaria HF with mRDTs in stock on day of assessment HF with Giemsa powder, buffer salts, pH meter calibrants, and tally counter in stock on day of assessment HF participating in EQA program HF performing IQA HF with any AL in stock on day of assessment HFs with Artesunate injection in stock on day of assessment HF with soft or hard copy of the current Kenya malaria diagnosis and treatment guidelines HF conducting patient follow up after administration of p. falciparum malaria treatment HF with linked CHU HF where linked CHU implement iCCM
Surveillance and response (number of questions - 6)	Sufficient and current HIS reporting tools available at the health facility HF with health worker trained in malaria surveillance or IDSR HF with staff trained in data analysis and management Reporting guidelines/standard operating procedures available at the health facility HF identified high-risk populations or areas Community health volunteers report malaria cases within the recommended 24 hours

Appendix 2: *Surveillance and response at health facility level; number of health facilities (percent)*

Description	Nyandarua (N=6)	Laikipia (N=6)	Kirinyaga (N=6)	Nyeri (N=6)	Overall (N=24)
Health facilities with sufficient and current HIS reporting tools	2 (33.3%)	5 (83.3%)	5 (83.3%)	4 (66.7%)	16 (66.7%)
Health facilities with IDSR focal person	5 (83.3%)	6 (100.0%)	6 (100.0%)	3 (50.0%)	20 (83.3%)
Health facilities with health worker trained in malaria surveillance or IDSR	5 (83.3%)	1 (16.7%)	3 (50.0%)	1 (16.7%)	10 (41.7%)
Health facilities with functional laptop or computer for reporting to the KHIS	4 (66.7%)	1 (16.7%)	3 (50.0%)	4 (66.7%)	12 (50.0%)
Health facilities with reporting guidelines or standard operating procedures	4 (66.7%)	3 (50.0%)	5 (83.3%)	4 (66.7%)	16 (66.7%)
Frequency and number of health facilities where community health volunteers report malaria cases within the recommended 24 hours					
Never	2 (33.3%)	4 (66.7%)	4 (66.7%)	2 (33.3%)	12 (50.0%)
Rarely	2 (33.3%)	0 (0.0%)	0 (0.0%)	1 (16.7%)	3 (12.5%)
Not applicable	2 (33.3%)	2 (33.3%)	2 (33.3%)	3 (50.0%)	9 (37.5%)
Health facilities with staff trained in data analysis and management	4 (66.7%)	2 (33.3%)	4 (66.7%)	3 (50.0%)	13 (54.2%)
Health facilities where staff know which populations and areas are at highest risk for malaria	4 (66.7%)	3 (50.0%)	2 (33.3%)	2 (33.3%)	11 (45.8%)

Appendix 3: *Access to care at health facility level; number of health facilities (percent)*

Availability of specified attributes at health facility level		Nyandarua (N=6)	Laikipia (N=6)	Kirinyaga (N=6)	Nyeri (N=6)	Overall (24)
Malaria diagnostic and treatment guideline	Current national malaria diagnosis and treatment guidelines (2020)	1 (16.7%)	3 (50.0%)	2 (33.3%)	2 (33.3%)	8 (33.3%)
	Health facilities performing malaria diagnostic tests on all suspected malaria cases as per the national malaria diagnosis and treatment guidelines	6 (100.0%)	6 (100.0%)	6 (100.0%)	6 (100.0%)	24 (100.0%)
Facilities performing specified diagnostic test	Microscopy	3 (50.0%)	4 (66.7%)	1 (16.7%)	5 (83.3%)	13 (54.2%)
	Both microscopy and malaria Rapid Diagnostic Test	3 (50.0%)	2 (33.3%)	5 (83.3%)	1 (16.7%)	11 (45.8%)
Quality assurance	Facilities participating in external quality assurance	5 (83.3%)	5 (83.3%)	6 (100.0%)	5 (83.3%)	21 (87.5%)
	Facilities performing internal quality control	5 (83.3%)	6 (100.0%)	5 (83.3%)	4 (66.7%)	20 (83.3%)
Patients follow up	Health facilities that conducted patient follow-up after administration of P. falciparum malaria treatment	2 (33.3%)	1 (16.7%)	2 (33.3%)	1 (16.7%)	6 (25.0%)
Integrated community case management (iCCM)	Health facilities with linked functional CHU	4 (66.7%)	4 (66.7%)	4 (66.7%)	5 (83.3%)	17 (70.8%)
	Average number of CHUs per linked health facilities (min, max)	3 (1,4)	2 (1,2)	2 (1,4)	3 (1,6)	2 (1,6)
	Total number of CHUs linked to the health facilities	10	6	9	16	41
	Percent CHUs linked to the health facilities implementing iCCM	4/10 (40.0%)	0/6 (0.0%)	2/9 (22.2%)	10/16 (62.5%)	16/41 (39.0%)

Appendix 4: *Availability of specified attributes for access to care at health facility level by county*

Availability of specified attributes at health facility level		Nyandarua (N=6) n(%)	Laikipia (N=6) n(%)	Kirinyaga (N=6) n(%)	Nyeri (N=6) n(%)	Overall (24) n(%)
Malaria diagnostic and treatment guideline	Current national malaria diagnosis and treatment guidelines (2020)	1 (17)	3 (50)	2 (33)	2 (33)	8 (33)
	Health facilities performing malaria diagnostic tests on all suspected malaria cases as per the national malaria diagnosis and treatment guidelines	6 (100)	6 (100)	6 (100)	6 (100)	24 (100)
Facilities performing specified diagnostic test	Microscopy	3 (50)	4 (67)	1 (17)	5 (83)	13 (54)
	Both microscopy and malaria Rapid Diagnostic Test	3 (50)	2 (33)	5 (83)	1 (17)	11 (46)
Quality assurance	Facilities participating in external quality assurance	5 (83)	5 (83)	6 (100)	5 (83)	21 (88)
	Facilities performing internal quality control	5 (83)	6 (100)	5 (83)	4 (67)	20 (83)
Patients follow up	Health facilities that conducted patient follow-up after administration of P. falciparum malaria treatment	2 (33)	1 (17)	2 (33)	1 (17)	6 (25)
Integrated community case management (iCCM)	Health facilities with linked functional CHU	4 (67)	4 (67)	4 (67)	5 (83)	17 (71)
	Average number of CHUs per linked health facilities (min, max)	3 (1,4)	2 (1,2)	2 (1,4)	3 (1,6)	2 (1,6)
	Total number of CHUs linked to the health facilities	10	6	9	16	41

Availability of specified attributes at health facility level		Nyandarua (N=6) n(%)	Laikipia (N=6) n(%)	Kirinyaga (N=6) n(%)	Nyeri (N=6) n(%)	Overall (24) n(%)
	Percent CHUs linked to the health facilities implementing iCCM	4/10 (40)	0/6 (0)	2/9 (22)	10/16 (63)	16/41 (39)