



Bridging the Preparedness Gap: Malaria Surveillance Data Quality, and Response Capacity in Kenya's Epidemic-Prone Counties, 2024

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Abstract

Malaria is a disease of public health importance in Kenya. Quality surveillance data is crucial in promptly detecting upsurges and for the timely response to prevent and mitigate the impact of malaria outbreaks. To evaluate the quality of weekly malaria surveillance data and the capacity for epidemic preparedness and response (EPR) in six epidemic-prone counties in Kenya, a cross-sectional study was conducted in 36 selected hospitals in the selected Counties. Data for quality audit (DQA) was collected retrospectively, while EPR capacity was assessed through interviews with healthcare workers. Availability and completeness of malaria reporting tools, reporting timeliness, and reporting accuracy were assessed, and the proportion of facilities meeting the requirements of the EPR guidelines was determined. Standard malaria reporting tools were available in >75% of facilities, 85.3% had incomplete documentation of temperature, weight, and malaria codes, 35.3% had acceptable completeness of report, 88.2% had timely reporting, 11.8% accurately reported confirmed malaria cases, 32.3% over-reported, while 47.1% under-reported. EPR guidelines were lacking in 89% of facilities, 80 % lacked EPR stakeholders/partners, 33.3% had outbreak committees, but <20% of the committees were trained on malaria EPR. Inadequate funding and a lack of EPR stakeholders/partners were reported as potential barriers leading to suboptimal dissemination and implementation of EPR guidelines, capacity building, and pre-outbreak responses. The lack of support for implementing EPR activities may have contributed to suboptimal surveillance data. To achieve Kenya's goal of reducing malaria incidence and deaths, there is to support the implementation of EPR guidelines to enhance EPR capacity.

Keywords: data quality, epidemic-preparedness, outbreak, surveillance data

Introduction

Malaria is a disease of public health importance in Kenya, where 128 subcounties within 26 counties are prone to malaria outbreaks. These regions are often susceptible to the rapid spread of infectious diseases due to various factors, including environmental conditions. Malaria outbreaks in highland, epidemic-prone and seasonal transmission counties coincide with heavy rainfall and sustained minimum temperatures of around 18°C, creating ideal conditions for mosquito breeding and survival. This is followed by a short, intense transmission of malaria (Elnour et al., 2023; Kipruto et al., 2017; Rono, 2020).

Prompt detection of malaria upsurges and potential outbreaks in epidemic-prone areas is done through monitoring the trends of malaria cases, which are reported every week through the Integrated Disease Surveillance Response (IDSR) system. Data from health facilities is summarized using an Epidemic Monitoring Form (MOH 505), which is subsequently submitted to the sub-county level, where it is uploaded to the Kenya Health Information System (KHIS). Within the KHIS, a malaria Epidemic Preparedness and Response (EPR) dashboard uses automated thresholds generated from five years' historical data for each reporting facility. While alert thresholds are calculated as 5-year weekly median, action thresholds are calculated as 5-year weekly median + third quantile (Hellen Gatakaa, 2024). The dashboard enables visualization of the uploaded data and allows health facilities, sub-counties, counties, and the national level to monitor trends in reported cases for each epidemiological week. This is crucial for the early detection of outbreaks or the detection of data quality issues. The detection subsequently allows the timely implementation of public health interventions and responses aimed at reducing morbidity and mortality associated with the outbreaks (NMCP, 2020).

The quality of the summarized and reported weekly malaria data has an impact on the strength of malaria surveillance systems and the ability to detect and respond to the increased number of malaria cases, and hence the need for investments in this system. In the year 2021, poor data quality in Nandi County (Githinji et al., 2024) and Kwale County (Odhiambo et al., 2024) were identified to cause an artifactual increase in malaria incidence. In 2024, detection of a malaria outbreak in Marsabit County, although first suspected by reviewing the EPR dashboard, could have been delayed due to suboptimal weekly surveillance data (Muguku et al., 2025). Improved data quality and regular monitoring of the malaria EPR dashboard at the facility and county levels could hasten public health response to malaria upsurges and prevent mortality and mortality associated with outbreaks. The National Malaria Programme (NMCP) is responsible for the policy guidelines and capacity building on EPR activities while the counties are responsible for EPR planning, implementing the guidelines and ensuring that response activities to malaria upsurges are undertaken, including communicating to the Disease Surveillance Unit at the National level (Kenya Malaria strategy 2023-2027; NMCP, 2020). The 2nd edition of the malaria epidemic preparedness and response guidelines were distributed by the NMCP in all epidemic-prone areas to facilitate timely detection and effective response (Kenya Ministry of Health, 2020). In June 2024, following the March-April-May rains, a review of the malaria dashboard at the NMCP revealed that a total of 26 Sub-counties within 15 epidemic-prone counties had reported upsurges in malaria; however, none had declared a malaria outbreak. This triggered an investigation in these counties to assess the quality of the weekly surveillance data and evaluate malaria epidemic preparedness and Response (EPR) capacity.

Materials and Methods

Investigation Sites

The investigation was conducted in selected health facilities from the following six counties: Kakamega, Nandi, Baringo, Uasin-Gishu, Elgeyo Marakwet and Kericho.

Investigation Design and Population

The investigation was done through a retrospective review of

records and interviews with healthcare workers involved in surveillance activities. The investigation population consisted of malaria records from the selected health facilities that reported upsurges, disease surveillance coordinators (CDSC/SCDSC), County and subcounty malaria control coordinators (CMCC/SCMCC), health facility in-charge (I/C), public health officers (PHOs), pharmacists, health promotion officers and health record officers (HRIOS).

Selection Criteria

First, six counties which had malaria cases exceeding action thresholds between epiweek 18 through epiweek 28 of 2024 were selected. Secondly, within each of the selected counties, sub-counties with surpassed thresholds were identified. Thirdly, health facilities having consistent upsurges and the highest caseloads were purposively selected in each of the sub-counties.

Study Period

The activity was conducted in August 2024.

Data Collection

Data for DQA were collected using the routine data quality assessment (rDQA) tool, which is a standard tool. The tool was slightly modified to allow the collection of weekly reported data for the Epiweek 25 through Epiweek 29, 2024, from selected health facilities for the following variables:

- Availability of malaria data collection and reporting tools: This included the outpatient register for both under-fives and five and above years (MOH 204A & MOH B), pharmacy commodity daily activity register (MOH 645), IDSR tool (MOH 505), outpatient monthly summary reports (MOH 705A & MOH 705B) and commodity monthly summary report (MOH 743).
- Completeness of data elements in source registers and the weekly summary tool: The number of patients seen at the outpatient and the number of records with incomplete entry for the key malaria variables (patient's temperature recording, weight and malaria coding) from Epiweek 25 through Epiweek 29 were collected from MOH 204 B. The number of missing variables in the weekly summary tools was also collected to determine the completeness of the weekly summary reports.
- Reporting timeliness for weekly data: The weekly malaria summary reports were checked to determine whether they were submitted to the next level for uploading to KHIS by Wednesday of the subsequent week.
- Reporting Accuracy: The weekly number of suspected, tested and confirmed malaria cases in the outpatient registers, weekly summary report, and KHIS were collected for Epiweek 25 to Epiweek 29.

Data for EPR capacity were collected through interviews using an EPR rapid assessment questionnaire (Appendix S1). The questionnaire covered pre-epidemic, epidemic, and post-epidemic phases with domains including coordination structures, surveillance activities, availability of malaria commodities, pre-outbreak and outbreak responses, and communication regarding

social behaviour change as per the EPR guidelines.

Data Analysis

For DQA, the availability of data collection and reporting tools was analyzed as the proportion of facilities with the prerequisite tools (MOH 505, MOH 204A &B, MOH 705 A, MOH 705B, MOH 645, and MOH 743), while completeness of data elements in the source register and reporting tool was analyzed as proportion of complete records and proportion of health facilities having acceptable completeness of $\geq 90\%$, below which indicate a data quality issue. Reporting timeliness was analyzed as the proportion of facilities submitting the weekly summary reports (MOH 505) by Wednesday of the subsequent week.

To determine reporting accuracy, a verification factor (VF) was calculated as the ratio of the value of confirmed malaria cases recorded in the primary register (MOH 204B) for each of the Epi weeks to the value uploaded in the KHIS as shown in the following formula:

Verification factor = (weekly value in MOH 204 B ÷ value in KHIS for the corresponding week)

A VF of 0.9-1.1 was acceptable for data quality; outside of which indicated a data quality issue.

A value less than 0.9 indicated over-reporting, while a value above

1.1 indicated under-reporting.

For the EPR capacity, the analysis was done based on the proportion of the expected EPR requirements that a facility met according to the EPR guideline and the proportion of facilities meeting the requirement. A descriptive analysis was done for the assessed facilities.

Ethical Considerations

The assessment was considered a public health emergency response; therefore, approval was not sought from an Institutional Review Board. The protocol was approved by the Ministry of Health through the Field Epidemiology and Training Program, and authorization for data collection was given by the County Departments of Health. Confidentiality and privacy were maintained using unique identifiers while adhering to data protection principles.

Key Findings

Distribution of Assessed Health Facilities

Out of the 36 health facilities assessed, a data quality audit was conducted in 34 (94.4%) of health facilities, out of which the majority (69.6%; n=25) of the health facilities were dispensaries and health centres (Table 1).

Table 1: Distribution of assessed health facilities in Epidemic-Prone Counties, August 2024 (N=36)

County	No. of HFs	Proportion (%)
Nandi	8	25.0
Kakamega	3	8.3
Uasin Gishu	3	8.3
Elgeyo Marakwet	8	22.2
Baringo	5	13.9
Kericho	8	22.2
Level of Health Facility		
Dispensaries	15	41.7
Health Centres	10	27.8
Subcounty hospitals	5	13.9
County hospitals	2	5.6
Faith-Based/private-owned facilities	4	11.1

Data Quality Audit

Availability of Malaria Reporting Tools

All the assessed facilities (100%) had MOH 705B and MOH 743.

Table 2: Proportion of Facilities with Availability of Tools, Up-to-Date Tools and Standard Tools in Epidemic-Prone Counties, August 2024 (N=36)

The rest of the malaria tools, apart from MOH 505, were available in more than 80% of the facilities. MOH 505 was lacking in 23.5% (n=8) of the facilities (Table 2).

Malaria Reporting Tool	Proportion of Health Facilities (%), N=34		
	Tool Available	Tool up-to-Date (%)	Standard Tool
Outpatient Registers for under 5's (MOH 204A)	85.3	79.4	88.2
Outpatient Registers for ≥ 5 's (MOH 204B)	82.4	82.4	73.5
Weekly IDSR Summary Tool (MOH 505)	76.5	76.5	79.4

Commodity Daily Activity Register (MOH 645)	97.1	85.3	97.1
Commodity Summary Tool (MOH 743)	100.0	97.1	97.1
Monthly Summary Tool for under 5's (MOH 705A)	94.1	91.2	94.1
Monthly Summary Tool for ≥ 5 's (MOH 705B)	100.0	91.2	97.1

All the facilities had at least one customized tool (not a standard MOH tool), the most common being MOH 204B in 21.6% of the assessed facilities, followed by MOH 505 in 21.6% of % facilities.

Completeness of Data Elements in Source Registers (MOH 204B)

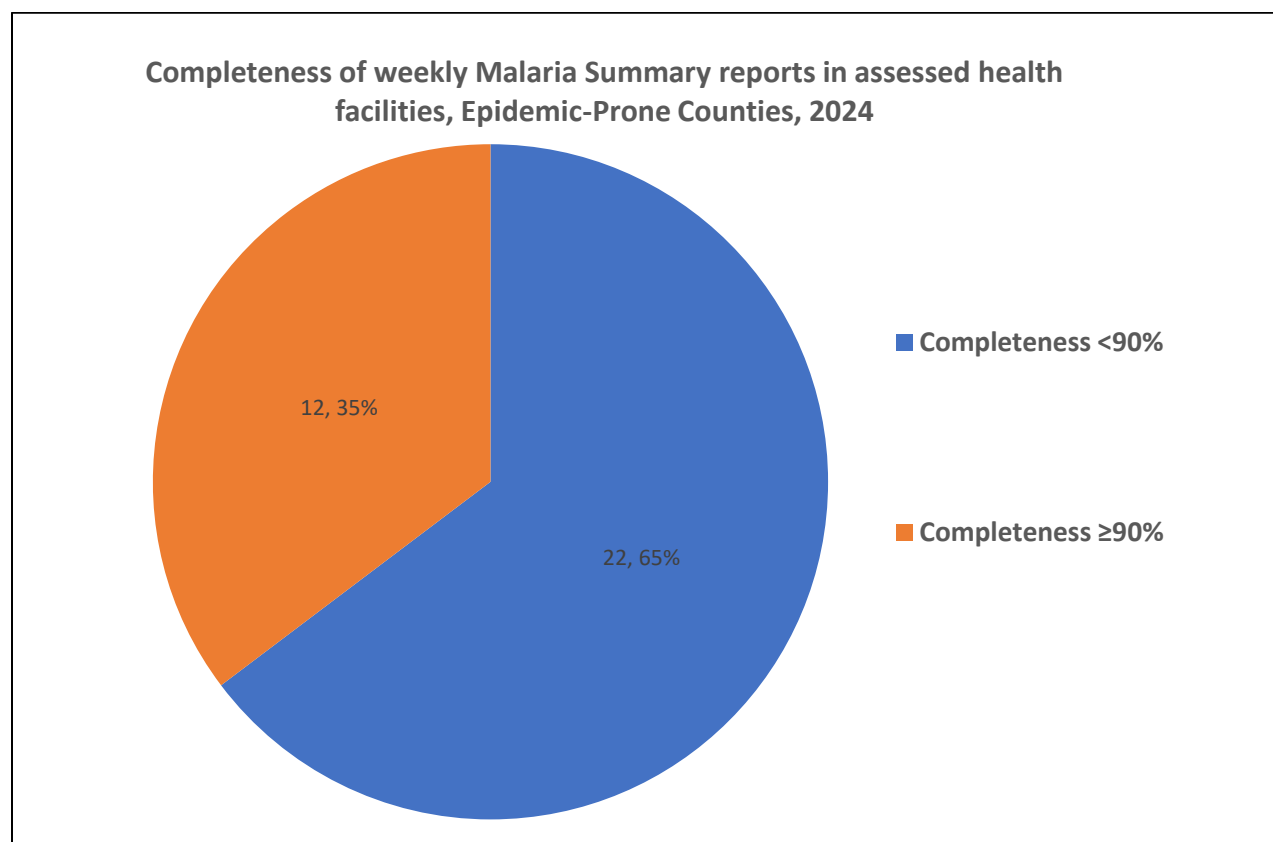
From the records in the outpatient registers, the patients' temperature, weight, and malaria code were the most common variables left blank. Only 14.7% ($n=5$) of the assessed health

facilities had $\geq 90\%$ of the records having malaria code, weight, and temperature reading recorded in the outpatient register (MOH 204B), while 85.3% ($n=29$) had $>10\%$ records with at least one of the variables not recorded.

Completeness of the Weekly Summary Reports (MOH 505)

Out of the 34 facilities assessed for completeness of the weekly summary report, only 12 (35.3 %) attained acceptable completeness of $\geq 90\%$ (Figure 1).

Figure 1: Completeness of Weekly Summary Tools, Epidemic-prone Counties, 2024 (N=34)



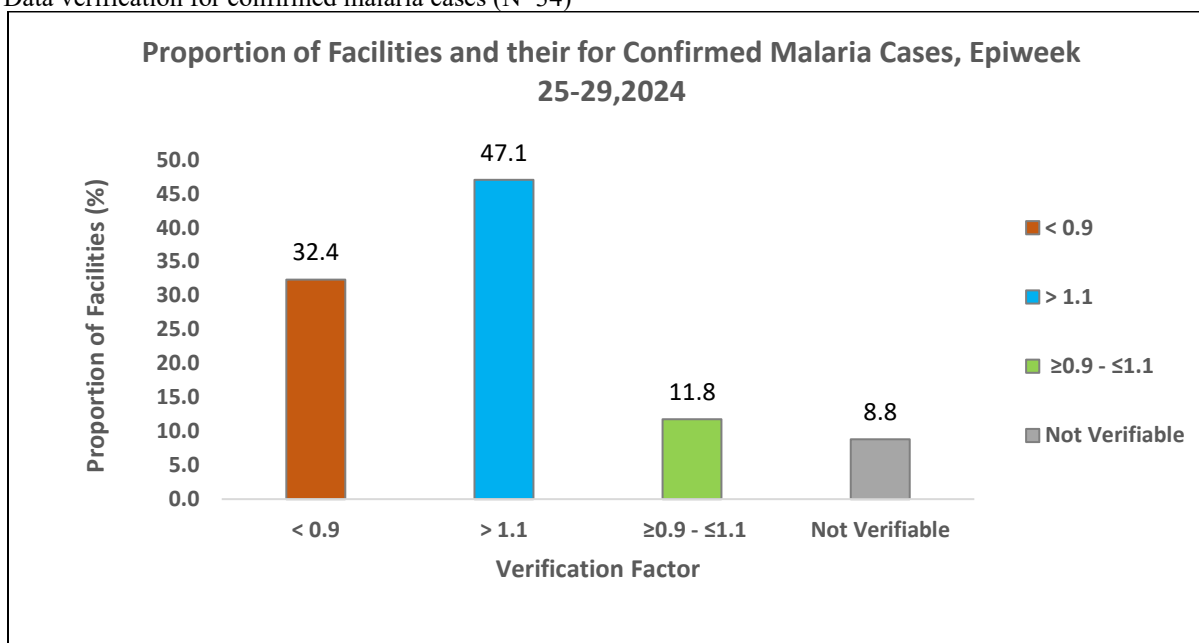
Reporting Timeliness (Weekly Report)

The majority (88.2%, $n=30$) of health facilities timely submitted the weekly malaria reports by the expected date of the subsequent week for uploading to KHIS.

Reporting Accuracy

At least 20 (64.5%) of the facilities were confirmed to have had a true upsurge of malaria cases surpassing thresholds. There were

variations in the number of confirmed malaria cases when three data sources were compared between the source register and the KHIS. Only 4 (11.8%) of the health facilities had an acceptable VF range of 0.9–1.1, while under-reporting was noted in 16 (47.1%) of the facilities. Over-reporting was noted in 11 (32.4%) of the facilities, and reporting accuracy could not be verified in 3 (8.8%) of the facilities because the cases were not adequately recorded in the source registers (Figure 2).

Figure 2: Data verification for confirmed malaria cases (N=34)**Epidemic Preparedness and Response Capacity**

Of the 36 health facilities in the epidemic-prone counties assessed, all (100%) were assessed for the pre-epidemic phase and 33 (91.7%) for the epidemic phase.

Capacity during the Pre-Epidemic Phase**Coordination structures**

While 97.2% of the health facilities had an annual work plan, only 69% had factored in malaria EPR activities plans. Although 88.9%

of the facilities placed orders for commodities every quarter, only 68.8% had commodities for malaria epidemics factored into the annual work plans. EPR guidelines were lacking in 89% of the facilities, and 80 % did not have stakeholders to support malaria EPR. Only 12 (33.3%) of the facilities reported having health facility outbreak committees. For those with outbreak committees, only 2 (18.2%) were trained on malaria EPR (Table 3).

Table 3: Pre-epidemic Coordination Structures, Surveillance Structures and Pre-outbreak Responses, in Epidemic-Prone Counties, 2024

Variable per EPR Guidelines	Frequency	Proportion (%)
EPR Coordination Structures		
Annual Work Plan (AWP)	35	97.2
Malaria EPR activities factored in AWP	20	69.0
Place quarterly orders for commodities	32	88.9
Commodities for malaria epidemics factored in AWP	22	68.8
Stakeholders for malaria EPR	7	20.0
HF Outbreak Committee	12	33.3
Malaria EPR Guideline available	4	11.1
Systems to monitor and predict malaria epidemics are in place	15	41.7
Receive regular meteorological information	4	11.1
Use meteorological information for forecasting malaria outbreaks	3	75.0
Surveillance structures		
Health facility has a disease surveillance focal person	24	66.7

Variable per EPR Guidelines	Frequency	Proportion (%)
IDSR Standard Case definition chart available	16	44.4
Weekly summary tool (MOH 505) available	31	86.1
MOH 505 Used to make weekly reports	30	96.8
Have access to KHIS	14	38.9
Malaria thresholds reviewed within 7 days	7	50.0
Malaria thresholds reviewed past 7 days	7	50.0
Notified higher levels when thresholds were surpassed	28	77.8
Received feedback on notification	24	85.7
Interpreted and shared feedback with healthcare workers	19	52.8
Pre-Outbreak Responses		
Malaria cases have ever reached alert thresholds	29	80.6
Description of cases	13	44.8
Submission of Slides for EQA	16	55.2
Data quality audit (DQA)	15	51.7
Feedback to affected areas	21	72.4
Targeted distribution of ITNs	9	31.0
Focalized indoor residual spraying (IRS)	0	0.0
Larval source management (LSM)	5	17.2
Pre-designed SBC messages for dissemination available	12	33.3
Had IEC materials for malaria EPR	10	27.8

Surveillance structures

The majority (66.7%) of the facilities had a disease surveillance focal person, with 96.8% of facilities reporting using weekly IDSR summary tools to make reports. Only 38.9% of the facilities had access to KHIS, with only half (50%) of those with access reviewing the malaria thresholds within seven days of reporting. Slightly above three-quarters (77.8%; n=28) of all the facilities reported to the higher levels when thresholds were surpassed (Table 3).

Pre-outbreak responses

While more than 80% of the facilities agreed that the reported malaria cases had ever reached alert thresholds, less than half (44.8%) did description of cases, 51.7% did a data quality audit to confirm the reported cases, and 72.4% gave feedback to the affected areas. About a third (33.3%) of the facilities had pre-designed messages, and only 27.8% had IEC materials for

dissemination to the community (Table 3).

Response Capacity During the Epidemic Phase

All (100%) the assessed facilities reported that they did not have adequate funds for operation during the outbreak, only 18.2% had stakeholders or partners' support and less than a third of the facilities (30.3%; n=10) formed an outbreak committee. Less than half (45.5%) of the facilities were supported by rapid response teams either from the subcounty, county or national level. Slightly above half (54.6%) of the facilities had the healthcare workers sensitized about the upsurges; however, the majority (87.9%) did not have adequate healthcare workers for the response. Only 6 (18.2%) had line lists updated daily and shared with the subcounties, counties and the national level, and only 1 (3%) had situation reports (SITREPs) prepared for sharing with healthcare workers and the management (Table 4).

Table 3: Proportion of Facilities Implementing Epidemic Phase Coordination Structures (N=36)

Outbreak Notification and Response Coordination	Frequency	Proportion (%)
No Adequate funds for operation during the outbreak	33	100.0
Stakeholders' or partners' support during the malaria outbreak	6	18.2
Outbreak Committee formed	10	30.3
Supported by Rapid Response Teams (RRT)	15	45.5
National RRT support	2	13.3
Subcounty RRT Support	14	93.3
Healthcare workers (HCWs) sensitized	18	54.6
No Adequate HCWs for response	29	87.9
Line list updated daily and shared with Subcounty/County	6	18.2
Daily SITREP Prepared from line list and shared with HCWs	1	3.0
Adapted and used the pre-designed SBC messages at the health facility	6	18.2
Distribute malaria IEC materials to the outbreak region	6	18.2

Discussion

This investigation assessed weekly malaria surveillance data quality and epidemic preparedness and response (EPR) capacity in six epidemic-prone counties in Kenya following heavy rainfall during Epiweeks 25-29, 2024. From the findings, we report observed gaps in the weekly surveillance system which includes gaps in data capture, collation and reporting and in the capacity of health facilities to respond to malaria upsurges. The malaria surveillance system through data reported through the Kenya Health Information System (KHIS) detected malaria upsurges in the assessed counties. The investigation confirmed these upsurges during data quality audit and corroboration of the seasonal increases by healthcare workers who were interviewed. Findings from this study shows that the weekly malaria surveillance system is capable of detecting temporal increases in malaria burden, particularly during high-risk periods. Similar results have been reported in studies from Kenya, where seasonal transmission patterns are reliably observed in KHIS / DHIS2 data, enabling warning of possible outbreaks (Githinji et al. 2024; Odhiambo et al. 2024). The investigation also reveals that when there are gaps in data capture, it may result to incomplete and inaccurate reported data which could otherwise compromise the system. Although the weekly reporting systems are often capable of capturing trends, incomplete and inaccurate reporting weaken the ability to respond and deploy appropriate public health interventions. Recent literature (e.g. Kenya's Advance Warning & Response System reviews) underscores that many sub-county/facility - level surveillance units detect surges but lack the capacity or structure to mount a robust response.

Data Quality Gaps

A striking finding in this study is that over 85% of facilities with upsurges did not record essential variables in outpatient registers – temperature, weight, and malaria codes. These items are fundamental to defining suspected malaria, determining severity, tracking epidemiologic metrics, and guiding diagnostic and treatment decisions. Missing these variables undermines the completeness of case data and complicates surveillance, estimation of suspected cases, confirmed cases, and the evaluation of disease burden. This study observed that only about 11.8% of health facilities accurately reported confirmed malaria cases, with about

32% over-reported and 47% under-reporting. These discrepancies could have been contributed by several factors. First, the outpatient registers have provisions for coding suspected, tested and confirmed malaria cases but the study observed that majority of the records were missing this code. Secondly, use of customized, non-standardized tools could have led to incomplete or inaccurate data being summarized. Customized registers often have different data structure and have omission of required key fields and since they may not be aligned with national register standards, they may not produce reliable data. Thirdly, due to incompleteness of the outpatient registers, health facilities tended to rely on laboratory registers (which omit suspected cases and vital patient context) to make their weekly reports. These findings are comparable to other studies in Kenya such as that Kwale County by Odhiambo et al, (2024), where incompletely filled outpatient registers were found to impede identification of suspected malaria cases. They are also consistent with a study in Nandi County where over-reporting in many facilities was related to poor documentation, largely due to missing register fields and inconsistencies (Githinji et al., 2024). The findings however contrasts those in a study in Kakamega County, where outpatient registers achieved >90% completeness for key variables (Sakari et al., 2024). The Kakamega study, however, was in a region where a surveillance monitoring & evaluation mentorship model was being implemented, suggesting that structured support, supervision, and standardization can markedly improve collection and reporting of malaria surveillance data. The study by Githinji et al. (2024) in Nandi also documented significant disparities between facility records and KHIS reports – both over- and under-reporting. These discrepancies were deeper in facilities using non-standard tools or in those with weak supervision. The Kakamega mentorship intervention again provides contrast: with standardized tools and active monitoring, reporting accuracy increased, showing reduced mismatch between source registers and summaries. Thus, misreporting is not just a data entry problem but a systems issue involving tools, training, and supervision.

For the weekly summary reports, this study observed a relatively high rate of timely reporting (88.2%), but a low rate of completeness (35.3%). Timely but incomplete reporting weakens the surveillance system by delaying appropriate responses by

authorities. About a quarter of facilities observed in our study who lacked standard weekly reporting tools relied on SMS to submit reports. SMS as a reporting medium is prone to transcription errors, missing metadata, delays in verification, and difficulty in quality checking. Recent Kenyan HMIS reporting reviews have flagged these risks, especially when SMS reporting is not supported by facility-level records or oversight. Although in the study in Nandi County by Githinji et al. (2024) completeness (77%), was assessed for monthly reports, it was higher than that observed in our study. These comparisons suggest that routine support supervision and mentorship can significantly raise both reporting timeliness and completeness of weekly surveillance reports.

EPR Capacity in Epidemic-Prone Health Facilities

The Kenya's Malaria Strategy 2023-2027 emphasizes the need for sub-national and facility units to have adequate training, strong coordination and operationalization of EPR plans. The Kenya EPR guidelines provides a framework for subnational levels to ensure EPR readiness, response planning, and clearer roles and structures (WHO Regional Office for Africa, 2020)

This study reveals substantial gaps in epidemic preparedness and response (EPR) capacity among health facilities in six Kenyan counties during both the pre-epidemic and epidemic phases. The study observed widespread absence of EPR guidelines and low stakeholder engagement in EPR activities. While almost all (97.2%) facilities had annual work plans (AWPs), only 69% had factored malaria EPR activities into these plans, and only 11% had EPR guidelines available. Only ~33.3% had outbreak committees; and of those, very few were trained (18.2%). Stakeholder involvement was also low (20%). This pattern is consistent with findings in the *Malaria EPR Rapid Assessment Report* for Kenya (2019), which showed that only about 35% of facilities had stakeholder support for malaria EPR and only about 40% had outbreak committees established.

Although majority of the hospitals reported availability of weekly summary tools (MOH 505) and high high usage of those tools for weekly reporting, access to KHIS (38.9%) was relatively low probably leading to slow review of thresholds. Only about half of facilities that had thresholds reviewed did so within 7 days. More recently, studies in Kenya looking at health facility readiness and vulnerability to climate change show that while many facilities can diagnose and treat malaria, they are less equipped for early warning (forecasting, meteorology) and community risk communication tied to climatic events (Ogony et al., 2025).

While majority of facilities reported that malaria cases had ever reached alert thresholds, less than half described cases, about half conducted data quality audits, and about a third had pre-designed social behaviour change (SBC) or IEC materials. Activities such as larval source management (17.2%) were rare; indoor residual spraying (IRS) was not conducted in any. Even during the outbreak phase, less than a fifth of affected facilities updates line lists daily, and only 3% prepared SITREPs. In contrast, in settings where NGOs or donor-supported programs have invested in EPR support, such as mentorship programs in highland or seasonal malaria zones, pre-outbreak responses (e.g. community sensitization, commodity preparedness, vector control measures) are more common. However, even in those better-resourced settings, IRS tends to be limited due to cost and logistic constraints. In other SSA settings, studies in highlands or seasonal transmission areas of Uganda, Rwanda, or Ethiopia show that while detection and

notification of epidemics may occur, formal epidemic phase response is usually weak owing to funding, human resource and commodity constraints. Those studies emphasize that outbreak committees are often ad hoc, and rapid response teams are not always available or supported (Ogony et al., 2025). A contrast emerges in settings with dedicated mentorship, partner support, or strong county health leadership. Though your study indicates weak EPR guidelines and training, in some counties (e.g. in parts of Kakamega, or studying community case management in Western Kenya), interventions such as CHV training, active case detection, and structured surveillance support have led to better alert response, better reporting, and improved capacity to implement outbreak measures. For example, the study on community case management in Western Kenya (2022) showed CHVs could reliably detect and manage malaria cases, support referral, and improve surveillance coverage. While that study is more about case management than EPR per se, it suggests that where human capacity is invested, response performance improves (Otambo et al., 2023). Additionally, the Kenya policy frameworks (Kenya Malaria Strategy 2023-27) are stronger now than in earlier years: policy aspirational targets include ensuring every epidemic-prone county has standard tools/guidelines, stronger stakeholder partnerships, and routine performance monitoring. These are not always met, but the policy environment is more favourable (WHO Regional Office for Africa, 2025).

The consistency of gaps found in this and in prior studies suggests systemic issues: inadequate funding, weak cascade of training and guidelines, insufficient human resources, lack of forecasting infrastructure, weak supervision/mentorship. Devolution of health services in Kenya sometimes leads to variable capacities across counties; counties with stronger leadership or partner presence seem to perform better. Also, donor or NGO support tends to bolster outbreak response capacity where it exists.

Limitation

This assessment was conducted three months after the initial detection of the malaria upsurges. As a result, the period for retrospective data quality assessment was selected for the most recent reporting period due to limited resources and in order to be more informative for decision-making. However, the assessment period did not include the entire period during which the upsurges were reported. Assessment for the response activities depended on verbal reporting by key informants.

Conclusions

The investigation confirmed that there was a seasonal increase in malaria cases in the assessed counties. Although the majority of facilities had prerequisite malaria reporting tools and were using them to collect and report malaria surveillance data, improvisation of tools and incomplete recording of key variables could have resulted in sub-optimal data quality, where only less than half of the facilities had an acceptable reporting accuracy. For facilities with laboratories, weekly summaries were done from the laboratory registers, which were considered more reliable, but the laboratory data could not provide data on suspected cases. From the findings of this study, the implementation of the EPR guidelines was affected by inadequate financial support for EPR activities.

Recommendations

From the findings of this study, there is a need for the departments of health in epidemic-prone areas to focus on strengthening malaria

surveillance by providing essential malaria reporting tools to all facilities, offering refresher training on surveillance data reporting procedures and consistent use of data collection and reporting tools to allow prompt detection of upsurges and potential outbreaks. To **enhance malaria epidemic preparedness and response systems, there is a need to** build partnerships to support EPR activities. The departments should **mobilize** dedicated funding for EPR activities, including capacity building, pre-outbreak preparedness, and stakeholder engagement. Malaria programs should **promote multi-sectoral collaboration by** engaging partners at national, county, and facility levels to coordinate malaria epidemic preparedness, surveillance, and response.

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Disclosures regarding conflict of interest

The authors declare that they have no competing interests.

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