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Utilizing Health Data for Malaria Surveillance and Prompt Response: Experience from Karenga District, North-Eastern Uganda

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Introduction: The transformative role of health data in achieving SDG 3 cannot be overstated, as data remains "the lifeblood of public health"(Ghebreyesus, 2019). The significant role of data in promoting the Sustainable Development Goals (SDGs), particularly SDG 3 (Good Health and Well-being), and improving disaster resilience continues to gain attention worldwide. Globally, in 2023, the number of malaria cases was estimated at 263 million, with an incidence of 60.4 cases per 1,000 population at risk, and the number of deaths was estimated at 597,000, with a mortality rate of 13.7 per 100,000 (World Malaria Report, 2024). Additionally, the same report indicates Uganda as the third country in Africa with the third-heaviest estimated burden of malaria cases at 5%. In a district like Karenga in the Karamoja Sub-Region of northeastern Uganda, where malaria is the top cause of morbidity and mortality, having access to timely and accurate data can significantly enhance health outcomes by enabling early detection.

Methodology: This Quality Improvement (QI) project started, May 2024, focused on a district-wide initiative aimed at collecting and analyzing malaria data from all public health facilities in Karenga District through the Health Management Information System (HMIS). Working closely with the Health Facility Incharges (HFIs) and the Health Information Assistants (HIAs) to ensure timely and complete submission of reliable data, the data gathered included weekly outpatient attendance, suspected malaria cases, malaria test positivity rates, and essential medicines and supplies. Data analysis was carried out with the aid of the inbuilt capabilities within the DHIS2, and geo-spatial maps indicating low- and high-risk areas were created or developed.

Results: The value of data lies not just in its collection but in its application for real-time decision-making (Gawande, 2010), as this case study shows. This initiative has resulted in several important outcomes:

Improved Reporting Timeliness and Accuracy: Since early 2024, the percentage of timely HMIS reporting has improved from 40% in May 2024 to 82.5% in March 2025, thanks to the tailored mentorship and feedback based on data, conducted by the District Health Team (DHT).

Identification of Malaria-Concentration Areas: Hotspot mapping using GIS technology has shown that three Sub-Counties of Karenga Town Council, Lobalangit Sub County, Kakwanga Sub County, and Sangar Sub County registered between 83 and 133 confirmed malaria cases, while the remaining seven Sub-Counties or Town Councils registered between 13 and 84 malaria cases. This finding led to the targeted implementation of community-level outreach for mass malaria testing and treatment in these areas.

Community-Driven Initiatives: The access to real-time data spurred quick community actions, such as health education, door-to-door distribution of mosquito nets, and routine entomological surveillance efforts organized by the district and some of the implementing partners within the district, including Doctors With Africa (CUAMM). This data-driven strategy enabled the prioritization of interventions based on incidence levels and transmission risk.

Advocacy for Resource Allocation: The District Health Team began using data visualizations in their discussions with district and national stakeholders to lobby for more resources and funding for malaria control and elimination efforts. This initiative resulted in Karenga being identified as a high-priority district to host a national event, "Walk Against Malaria,"on 10th April 2025, including other control activities such as malaria vaccination.

Enhanced Disaster Resilience: Ensuring local ownership of data is critical for sustainability and accountability in rural contexts (Alkire, 2015). By having the community and district-level teams consistently map health and environmental data, the district was able to proactively plan, budget, and direct resources to highly vulnerable areas during times of heavy rainfall, effectively preventing potential malaria upsurges. This integration of health and weather data marked a significant step forward in our disaster risk management.

Conclusion: This case study from Karenga District illustrates how localized, democratized, and contextualized

data can serve as a significant catalyst for change, even in underserved areas. Key takeaways highlight the necessity of engaging the community, enhancing the data literacy of frontline health workers, and utilizing geospatial mapping for effective disease surveillance. Innovative concepts emerging from this study include: integrating community-level data from the Village Health Teams (VHTs) into the data value chain to improve data credibility and foster trust; testing a real-time malaria alert system via SMS to inform health teams when malaria hotspots exceed critical levels; and combining health and climate data dashboards at the district level to facilitate proactive measures. The value of data lies not just in its collection but in its application for real-time decision-making (Gawande, 2010), a key lesson adopted by district health teams and political leaders in Karenga. To sustain this initiatives, it is essential for government and development or implementing partners to invest in the infrastructure needed for data management, encourage multi-sector collaborations, and cultivate a culture of data utilization across all levels of administration and management.

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