

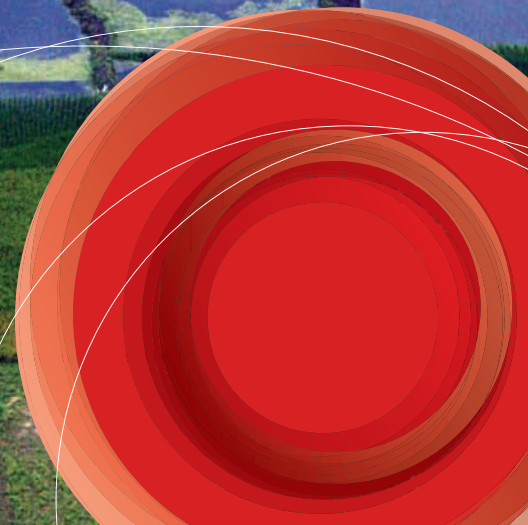


Systems for the early detection of malaria epidemics in Africa

*An analysis of current practices
and future priorities*



**World Health
Organization**



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Jean-Olivier Guintran, Charles Delacollette and Peter Trigg



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Abbreviations

ACR	Adult-to-child ratios	ITN	insecticide-treated net
ACT	artemisinin-based combination therapy	LQAS	lot quality assurance sampling
CDS	communicable diseases	MCPSS	malaria control programme surveillance system
CFR	case-fatality rate	MEWS	malaria early warning system
CMR	crude mortality rate	MSF	Médecins Sans Frontières
C-SUM	cumulative sum	NDVI	normalized difference vegetation index
DHS	demographic and health survey	NMCP	national malaria control programme
EDS	early detection systems	PHEIC	public health emergencies of international concern
EIR	entomological inoculation rates	pLDH	plasmodium lactase dehydrogenase
EWAR	early warning and response	QA	quality assurance
GFATM	Global Fund to fight AIDS, Tuberculosis and Malaria	RDT	rapid diagnostic test
GIS	geographical information system	SOP	standard operating procedures
HIMAL	Highland Malaria Project	SPR	slide positivity rate
HMIS	health management information system	VMH	village malaria workers
HRP2	histidine-rich protein-2	WHO	World Health Organization
IHR	International Health Regulations		
IMCI	Integrated Management of Childhood Illness		

Executive summary

The development and implementation of effective early detection systems (EDS) for malaria epidemics are both of high priority and urgent in Africa south of the Sahara. Most of these epidemics have occurred in highland and desert-fringe areas where malaria transmission is unstable, the population has little immunity, and increases in temperature and abnormal rainfall have resulted in vector proliferation. Other epidemics have occurred as a result of environmental and social changes as well as of the failure of control measures.

It is not widely understood that malaria epidemics are serious public health emergencies that have a major impact on health and the economy. The most important factor in reducing their impact is a timely response, with the implementation of effective preventive or control measures once an epidemic has been predicted or detected. A malaria EDS aims to detect the early stages of an epidemic by measuring changes in the incidence of malaria cases. The basic concepts and guidelines for building national capacity for the early detection and control of malaria epidemics were developed by WHO during the period 1998–2003. This report reviews in detail the literature and country experiences gained from the implementation of these recommendations in Africa, with particular reference to Ethiopia, Madagascar and Sudan, three of the most epidemic-prone countries in Africa. It identifies major technical and operational constraints and suggests actions that may contribute to the development of more effective EDS in the future.

Delimitation and mapping of epidemic-prone areas is an important step in the development of an EDS. None of the various models proposed to designate levels of endemicity is fully applicable in all situations. A more pragmatic approach is to map epidemic-prone districts according to historical reports of previous epidemics and recent point estimates of childhood parasite prevalence (values < 25% could define areas prone to epidemics). In addition, the report provides some tentative guidance to adapt EDS strategies to different epidemiological situations by proposing a “qualitative risk stratification” to determine “unpredictable” exaggerated seasonal transmission that occurs in highland-fringe areas, and a malaria early warning system (MEWS) for predictable “true” epidemics that predominantly occur in semi-arid desert-fringe areas.

Countries have set the goal that national EDS should detect malaria epidemics within two weeks of their onset. This can only be achieved if the data collected are representative, their collection and notification punctual, their analysis prompt and their interpretation able to provide an accurate indication of a developing epidemic. Recent experience has shown that currently operated surveillance systems in most countries do not meet the criteria to reach

this goal. The reasons vary between countries. These include administrative structures that are not conducive to rapid communication, inconsistent guidelines, inconsistent case definitions, lack of standard operating procedures (SOPs), unsuitable formatting and registration of data, lack of representative data, and inappropriate aggregation of data. Where reporting is suitable, it is often compromised by monthly reporting that is unable to detect epidemics fast enough to enable an effective response. These constraints are compounded by the lack or poor quality of laboratory services at the peripheral level that renders difficult the confirmation of malaria disease.

The report proposes the following to assist countries in overcoming these constraints:

- A simple basic structure for an EDS consisting of three levels: (i) a limited number of peripheral health services acting as sentinel sites for data collection; (ii) the district or intermediate level (for data analysis and response); and (iii) the central/provincial level (for policy, planning and coordination).
- A sentinel-site approach with 2–3 strategically situated sites per district and a mobile emergency team to confirm epidemics in the surrounding areas. Specific criteria for selection of these sites are given. Such an approach is considered to be the most cost-effective way in the short term of strengthening the peripheral health services to fulfil the needs of EDS. As financial and trained human resources become more widely available, the sentinel-site system can be expanded if required.
- The adoption of standardized mutually-exclusive malaria case definitions throughout the health services and standardized operating procedures for patient registration in the clinic, diagnosis by the clinic and supporting laboratory services, and for the analysis and reporting of data (for which detailed proposals are made).
- The adoption throughout the system of weekly reporting, since monthly

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