5. Response to epidemics and complex emergencies

Abuja target

The target of Roll Back Malaria in the Abuja Declaration is that 60% of epidemics are detected within 2 weeks of onset and 60% of epidemics are responded to within 2 weeks of detection (3).

Some 110 million Africans live in areas at risk for epidemic malaria (Figure 5.1). The increasing frequency of epidemics in both low-risk areas and areas of moderate transmission make imperative the institution of special responses to epidemics, in addition to regular malaria control activities. The impact of epidemics can be greatly reduced by timely detection or, ideally, prediction and prevention. Timely response may include the deployment of additional drug stocks, use of different drugs, and vector control.

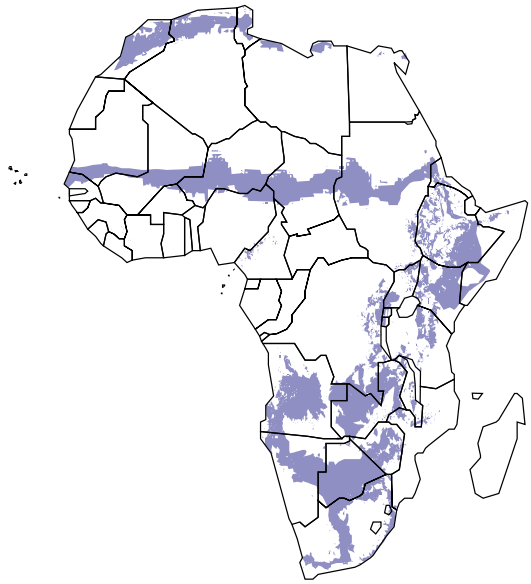
5.1 Magnitude of the problem

Devastating malaria epidemics have recently been reported from Botswana, Mozambique, South Africa, Swaziland and Zimbabwe (Figure 5.2) and have been attributed mainly to heavy rainfall following a drought. Epidemics also affected several Sahelian countries in the 1990s.

In East Africa and the Great Lakes region, Burundi, Ethiopia, Kenya, Uganda, and the United Republic of Tanzania, are subject to frequent and recurrent malaria epidemics that often affect large numbers of people (Table 5.1). Anomalies of rainfall and/or temperature are thought to be the most important causes of the epidemics here.

Although the extent of suffering caused by malaria epidemics is not adequately documented, it is generally believed that morbidity, mortality, and the overall economic impact of these epidemics are enormous. For example, the number of deaths during the malaria epidemic that hit Ethiopia in 1958

Areas at risk of epidemic malaria



Source: reference *15*

Figure 5.1

What is a malaria epidemic?

A sharp increase in malaria incidence among populations in whom the disease is infrequent, or an increase in clinical malaria in areas of moderate transmission constitutes an epidemic.

Malaria epidemics occur principally in areas of low transmission, where no single age group in the population is immune. The introduction of malaria, particularly if exacerbated by changes in rainfall and temperature, can trigger explosive epidemics that affect both adults and children (*1*). However, epidemics can also occur in areas of higher transmission as a result of the abandonment of control programmes, immigration of non-immune people, and reduced access to treatment.

Historic examples of severe epidemics

Place, year	Population exposed	Episodes	Deaths	Causes
Madagascar highlands, 1987–1988 (*1*)	2.5 million	Over 200 000 each year; at peak, 27% of outpatient attendances	15 000-30 000 each year	Abandonment of IRS and shortage of antimalarials
Ethiopia highlands/ Dumbia plain, 1958 (*1*)	8-10 million	3 million	Over 150 000 (case fatality rate >5%)	High rainfall and temperature
Ethiopia, Dec. 1997 Feb.1998 (*1*)	45 million	>1 million	3271 officially reported	High rainfall and temperature
NE Burundi, Oct-2000- May 2001 (*9*)		2 million during 6 months — a 4-fold increase in confirmed cases (*10*)	1287 reported, true number estimated to be 10-15x higher.	Abandonment of control (in relation to complex emergency), chloroquine resistance and expanded rice cultivation.

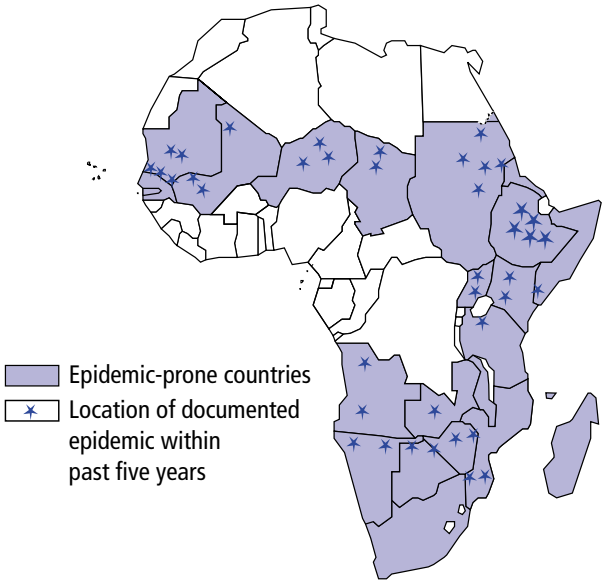
Table 5.1

was estimated at more than 150 000 out of 3 million clinical cases (a case-fatality rate of 5%) (*1*). Adults account for a relatively large proportion of epidemic cases and deaths.

On the basis of the following assumptions (*4*) it is estimated that there are 110 000 deaths from epidemics each year:

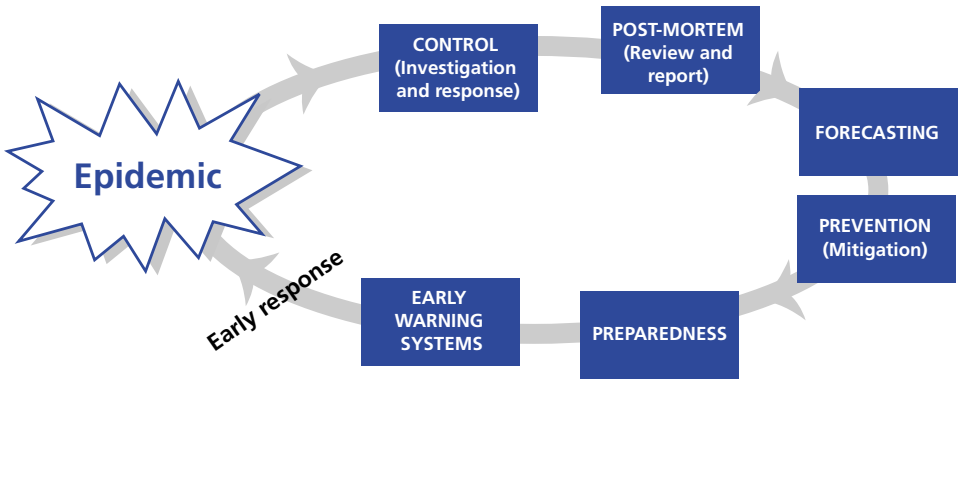
- 110 million Africans are at epidemic risk
- Epidemics occur on average every 5 years (cyclical) (*5*)
- Assuming 0.5 malaria episodes per person during epidemics:
  - 0.1 episodes per person at risk per year
  - 11 million malaria episodes in epidemics each year
- Up to 5% of malaria episodes are severe, with case-fatality rate for severe episodes in epidemics possibly up to 20%:
  - possible 110 000 malaria deaths from epidemics each year.

Malaria epidemics in Africa 1997–2002



Source: RBM data

Figure 5.2



Source: reference *6*

Figure 5.3

5.2 Prevention and control of epidemics

The main functions of a malaria control programme in combating epidemics are illustrated in Figure 5.3 and described in greater detail in several WHO documents (*1*).

The burden of an epidemic will be much less if the number of cases is contained by early detection and rapid response (*1*) (Figure 5.4).

Antimalarial treatment during epidemics

It may be necessary to formulate drug policies for treatment during epidemics, because malaria epidemics usually involve non-immune patients who have lower spontaneous parasite clearance than partially immune patients from endemic areas. It is essential that treatments selected for use in these situations are highly effective. The trend is toward artemisinin-based combinations (ACT) which have the added advantage of reducing gametocyte carriage. Some countries, e.g. Burundi, Ethiopia, and Mozambique, have already adopted special drug policies for epidemics.

5.3 Progress and challenges

Identification of risk areas

Table 5.2 shows 15 of the 25 African countries which have identified their areas of risk and have prepared plans to respond to epidemics.

Actual detection and response

It is difficult to say with certainty whether countries are close to the Abuja target of 60% adequate detection and response. Evaluation is hampered by the diverse nature of epidemics and associated definition issues.

In evaluations of control programmes, timely detection has been found to be a bigger challenge than adequate and timely response once an epidemic has been identified (*7*). (Table 5.3) However, there is indication that response, especially with measures like indoor residual spraying, is often too slow (more than 2 weeks after detection of the epidemic) as well.

Integrated Disease Surveillance

A recently initiated programme on Integrated Disease Surveillance and Response, promoted by WHO/AFRO, is helping epidemiologists to select and use accurate indicators – initially on a monthly basis. In defined epidemic-prone districts, the second step is to collect weekly malaria morbidity and mortality data in order to detect any unusual increase occurring within 2 weeks and to take immediate action. This programme has considerable potential for rapidly improving the capacity for early detection of epidemics of malaria and other diseases; its implementation is making good progress across the continent (Table 5.4).

Malaria Early Warning Systems

Malaria Early Warning Systems (MEWS) are intended to facilitate the timely responses that will prevent and contain epidemics. MEWS comprise forecasting, early warning, and early detection. Forecasting usually refers to seasonal climate forecasts; early warning refers to the monitoring of meteorological conditions such as rainfall and temperature; and early detection is based on routine clinical surveillance.

RBM has supported the development of a simple tool to monitor epidemic risks in marginal transmission areas based on anomalies in rainfall and temperature, i.e. rainfall in excess of or less than the expected amount, as identified from satellite observations. The predictions point to epidemics that might occur around 6 weeks after the detected meterological change. The risks are displayed on maps which are updated every 10 days and can be freely accessed via the RBM web site or at http://edcsnw4.cr.usgs.gov/adds/.

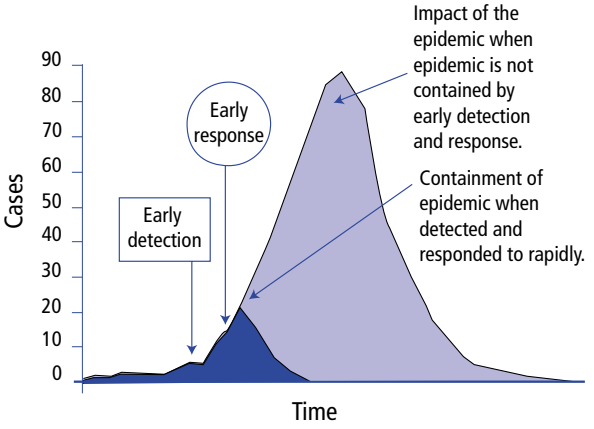


Figure 5.4

MEWS are generally performing well in southern Africa, and studies have started in Ethiopia, Kenya, Uganda, the United Republic of Tanzania, and Sudan. Decision-tree models are being constructed and validated. Work remains to be done to better involve staff from meteorological services in joint ventures with ministries of health to regularly compile and evaluate data and disseminate warnings to communities.

Country with epidemic risk and preparedness plan of action	Risk areas
Angola	All risk areas
Botswana	All risk areas
Burundi	Highlands
Ethiopia	Highlands
Kenya	Highlands
Mozambique	All risk areas
Namibia	All risk areas
Rwanda	Highlands
Senegal	Close to Senegal river
South Africa	All risk areas
Swaziland	All risk areas
Sudan	Sahelian areas
Uganda	Highlands
Zambia	Highlands
Zimbabwe	Highlands

Sources: references *6*, *12*, *13*

Table 5.2

	Epidemics identified 1998–2000	Percentage detected within 2 weeks	Percentage responded to within 2 weeks of detection	Source
Angola	3	0	0	SAMC
Botswana	2	100	100	SAMC
Malawi	–	–	_	SAMC
Mozambique	3	67	67	SAMC
Namibia	3	0	33	SAMC
South Africa	4	100	100	SAMC
Swaziland	2	100	100	SAMC
Tanzania	–	–	–	SAMC
Zambia	_	-	-	SAMC
Zimbabwe	3	33	67	SAMC
Eritrea	4 (districts)	75	100	RBM baseline survey
Ethiopia	102	55	100	RBM baseline survey
Uganda	?	0	100	RBM baseline survey

Note: SAMC – reference 7

Table 5.3

Status of Integrated Disease Surveillance implementation, 2002

Guidelines adapted	Botswana, Eritrea, Ethiopia, Ghana, Kenya, Malawi, Mali, Nigeria, Swaziland, Tanzania, Zambia.
Guideline adaptation initiated	Burkina Faso, Cameroon, Chad, Congo, DRC, Equatorial Guinea, Gabon, Gambia, Guinea-Conakry, Mozambique, Namibia, Rwanda, Seychelles, Uganda, Zimbabwe.
Plan of action completed	Lesotho, Madagascar.
Assessment completed	Benin, CAR, Mozambique,

Table 5.4

Complex emergencies

A large proportion of malaria deaths in Africa occur among populations affected by conflicts. Population displacement, malnutrition, and breakdown of health systems characterize these conflicts, making victims highly vulnerable to disease. Given the large numbers of cases occurring within short periods of time, and the consequent heavy burden on the health system, malaria epidemics in complex emergencies might be considered as "man-made epidemics".

International organizations are the main providers of relief assistance – in the first instance, emergency shelters, clean water, and food – to displaced populations, then basic health care.

A main requirement in complex emergencies is coordination of the activities of different NGOs to streamline the technical approaches for malaria-specific interventions (cost-effective drugs, ITNs, and residual spraying) and to ensure that existing resources are used cost-effectively, within a context of basic health care.

Epidemic control in southern Africa

Systematic epidemic control is standardized to the greatest extent in southern Africa, where it is being coordinated under the Southern African Malaria Control programme (SAMC). Since 1998, a regional approach to reducing the impact of malaria epidemics includes strategic planning, forecasting, prevention, preparedness and early warning to facilitate an improved early response (*6*, *14*).

Several SAMC countries use residual house spraying and distribution of ITNs for epidemic prevention, and most use residual house spraying as early response to reduce epidemic impact.

Capacity for detection – southern Africa

Country	Forecasting	Weekly surveillance epidemic-prone districts	Evaluation short-term weather	Epidemic plan	Manual guidelines	Epidemic control committee	Contingency (drug) stocks	Epidemic funds
Angola	No	No	No	Yes	No	No	Yes	No
Botswana	Yes	Yes	Yes	Yes	Yes	Yes	Yes	No
Malawi	No	No	No	No	No	No	No	No
Mozambique	Yes	Yes	No	Yes	No	No	No	Yes
Namibia	Yes	Yes	No	Yes	Yes	Yes	No	Yes
South Africa	No	Yes	No	Yes	Yes	Yes	No	No
Swaziland	Yes	Yes	Yes	Yes	No	Yes	Yes	No
Tanzania	No	No	No	No	Yes	No	No	No
Zambia	No	No	No	Yes	No	No	No	No
Zimbabwe	Yes	Yes	No	Yes	No	No	No	Yes

Table 5.5

Other activities supported by WHO and other RBM partners include:

- producing and distributing an emergencies handbook;
- operational research into emergency management, including suitable drug regimens;
- increasing capacity on the ground, including training;
- stimulating the development of tools, such as insecticide-impregnated sheet shelters and blankets.

5.4 Strategies for the future

A key challenge for district and national health managers is to improve the use of data routinely generated at the peripheral level, using Integrated Disease Surveillance where appropriate. In areas affected by epidemics related to anomalies in seasonal rainfall and temperature, joint MoH/meteorological services teams should be set up to promote the use of local epidemic predictions. Similar coordination mechanisms may need to be established among appropriate government services in areas that are affected by epidemics linked to, for instance, migration or agricultural practices.

Control options are as important as prediction and early detection; they must be well defined and agreed upon in advance by the MoH and partners of malaria control programmes as part of a preparedness plan of action allowing for rapid and cost-effective deployment. Treatment options may need to include new and more effective drugs or drug combinations (such as ACT) to be supplied free of charge to all malaria patients in the early stage of an epidemic. As regards efficient vector control approaches, the controversy surrounding the choice of insecticides for IRS needs to be resolved. Logistic support capacity should be

strengthened in countries considering the use of IRS for early response or prevention. In epidemic-prone areas, all strategies to increase the coverage with ITNs to a level that reduces transmission are relevant to epidemic prevention.

Broad agreement on the choice of efficient prevention and control options will contribute to securing funds from RBM partners in advance of the epidemic season, particularly for the establishment of essential emergency stocks. In this context, collaboration in epidemic risk assessment and response with other epidemic-prone countries by managing subregional/cross-border surveillance systems and emergency stocks is vital. The participation of NGOs in national and international partnerships is particularly important, because these groups can rapidly deploy assistance at field level.

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Epidemic detection in Kenya

Early warning based on district-level rainfall estimates had high potential for detecting two epidemics in summer 2002 in four highland districts in south-west Kenya. The district-specific warnings could have given 4 weeks' notice of possible emergency conditions, as identified in a retrospective analysis.

The rainfall estimates are freely available and their use requires minimal training and technical facilities. In this setting, seasonal forecasts proved to be less specific and less accurate. Early detection based on surveillance of outpatient cases provided sentinel information too late, because the reporting – although fairly complete – was monthly (weekly reporting under Integrated Disease Surveillance was not yet active at this time) (*8*).