Evaluation of national malaria control programmes in Africa*

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Evaluation is an essential management tool for the improvement of public health programmes or projects. As malaria morbidity and mortality continue to increase in most countries in Africa, international agencies and malaria control programme managers have identified the strengthening of programme evaluation as an important strategy for improving the efficiency and effectiveness of malaria control programmes.

Managers can develop an evaluation strategy only after they have defined programme objectives and planned specific programme activities. Indicators should be directly related to programme objectives and should be selected on the basis of the following criteria: their validity; reliability; ability to detect change within a reasonable time period and as a result of successful programme implementation; ability to be interpreted; and usefulness in guiding programme change. Only those indicators that can be measured with available programme resources should be selected. Managers will also need to identify the sources of indicator data and to determine how often each indicator will be measured.

Programme managers should develop criteria or indicators for the following: programme policies and plans; the process of programme implementation; the outcomes of malaria control interventions in disease management and prevention; and programme impact in terms of reductions in malaria-related mortality and morbidity. Key issues related to the management of evaluation activities within a national programme include the need to begin with available resources and build incrementally; to explore options for administering evaluation activities; to select, train and supervise staff who carry out evaluation activities; to develop quality control strategies; and to ensure that data are managed and communicated in ways that support effective programme decision-making.

For evaluation to lead to improvements in malaria control programmes it must be clearly defined as a part of the programme management process. Programme managers should lead this developmental process, ensuring that evaluation methods produce the information they need to monitor and improve their programmes at reasonable cost.

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Introduction

Inadequate implementation of control programmes has limited efforts to address an already serious malaria problem in Africa (1). In response to this, in

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1992 a ministerial conference on malaria issued a global strategy for malaria control (2). Both this conference and the experiences of African malaria control programme managers highlight the strengthening of programme evaluation as a priority step in improving control programmes and reducing malaria-related morbidity and mortality.

Programme evaluation in public health can be defined as the systematic collection and use of data to improve health programmes and guide the allocation of programme resources (3, 4). Managers must evaluate their programmes to determine whether they are achieving their objectives and to make decisions about programme design, operations, and resource allocations (5). Fig. 1 shows schematically the components of a malaria control programme. A strong malaria policy and programme plan, supported by an effective public health infrastructure, provides the basis for the implementation of appropriate disease management and prevention interventions. These interventions then result in measurable programme impact on malaria-related mortality and morbidity (6). Evaluation activities are designed to track progress in achieving this impact, providing managers with timely information on programme operations and outcomes.

Responsibility for programme evaluation rests with national malaria control programme managers (4), and every effort should be made to strengthen their capacity to do this. Programme reviews conducted by external evaluators are often geared towards the requirements of international organizations. Although often tied to the provision of resources, these external evaluations may not build managers’ skills or promote the frequent and continual evaluation needed for effective management of control programmes. Regional and international agencies and organizations need to establish evaluation systems for malaria control as programmes begin to flourish within countries. These bodies can meet this need by abstracting information from that collected for use at the country level.

The present article presents and discusses issues related to the evaluation of malaria control programmes in Africa. The importance of programme planning and the development of programme objectives as bases for sound evaluation are discussed; guidelines and sample indicators for the evaluation of malaria control policies, plans, and programmes are presented; the challenges of measuring the epidemiological impact of programme interventions are discussed; and key issues in the management of evaluation activities are reviewed.

**Evaluation as part of programme planning**

Evaluation is a critical element of malaria control programmes. The following planning activities are essential to sound evaluation practice: defining programme objectives; selecting appropriate evaluation criteria and indicators; and identifying appropriate data sources and determining how often indicators will be measured. Each of these activities is discussed below.

**Defining programme objectives**

A prerequisite for evaluation is the development of a programme plan with measurable process, outcome, and impact objectives that are logically related to one another and to goals and interventions defined in the national malaria control policy. Impact objectives target changes in mortality and morbidity expected to result from programme activities, and should correspond to the priority goal of the programme (e.g., mortality reduction) as stated in the national policy. Outcome objectives target changes in knowledge, attitudes, behaviours, or availability of needed services or commodities that result from programme activities, and should be directly related to the priority intervention (e.g., disease management or prevention), priority target population (e.g., under-5-year-olds), or those charged with the care of the target population (health care workers, mothers, family members, etc.). Process objectives specify the actions needed for programme implementation, and should correspond to the various activities (training,
supervision, commodity supply, surveillance, health education, operational research, etc.) necessary to achieve the intended outcomes and impact.

The selection of programme objectives is influenced by the following:

— their direct relationship to national policy;
— their feasibility and practicality given available resources, including the likelihood that they can be achieved within the stated period; and
— their amenability to measurement and observation, including the availability of baseline information against which to assess progress.

**Selecting criteria and indicators**

Once measurable objectives have been defined, managers can make plans for evaluation based on specific criteria and indicators. Criteria are technical standards that can be used as the basis for making judgements about the quality of a policy, plan, or programme component. For example, criteria for a programme plan might be whether it includes measurable objectives or whether planned activities are likely to lead to the achievement of stated objectives.

Indicators are quantified measurements that can be repeated over time to track progress toward the achievement of objectives. Selection of indicators should be based on their validity — the extent to which the indicator is a true and accurate measure of the phenomenon under study (7, 8); reliability — the extent to which indicator measurements are consistent and dependable across applications or over time (8, 9); ability to detect change within a reasonable period and as a result of successful programme implementation; ability to produce data that can be easily interpreted; and usefulness in guiding programme change. Only those indicators that can be measured with available programme resources should be selected.

**Data sources and frequency of indicator measurement**

Once programme objectives have been defined and the criteria and indicators selected, managers must identify the best sources of data and determine how often indicators and criteria will be measured. Reports and records collected as a routine part of service delivery, e.g., health information systems, reports by supervisors, or stock inventories, can be important sources of evaluation data if they are sufficiently accurate. Where such data do not exist or are not yet accurate, special surveys or audits may be necessary. Managers should also investigate whether data collected for other purposes or programmes are available and appropriate for use in evaluating malaria control programme activities. For example, large-scale surveys conducted for other child survival or family planning programmes may provide an opportunity to obtain community-based indicator data.

Managers must also determine how often indicators will be measured. Among the considerations that should be made are the following: the resources needed to collect data for a specific indicator (e.g., data for supervisory reports can be collected more frequently than data from a survey of the population); when indicator data will be needed to guide programme decision-making (e.g., data should be collected, analysed, and prepared for dissemination before rather than after a programme review exercise); and when meaningful changes in indicator levels can be expected, given programme activities (e.g., there is no need to measure the availability of first-line antimalarial drugs in facilities if none have been available for distribution for the past 6 months).

**Evaluation criteria and indicators**

In programme evaluation, there must be a direct relationship between planned programme activities (as reflected in process objectives and indicators or criteria) and anticipated results (as reflected in outcome objectives and indicators). Important criteria for evaluating programme quality include the extent to which its activities are logical, cohesive, and sufficient to achieve anticipated outcomes and impact.

**Programme policies and plans**

The evaluation of programme policies and plans may be judged using a set of predetermined criteria (4). Criteria that may be useful as a starting point are presented in Table 1.

**Programme implementation**

Programme managers are ultimately concerned with the achievement of outcome and impact objectives. Of more immediate concern, however, is tracking the shorter-term process of programme implementation, or monitoring. The achievement of process objectives, which focus on the routine and continuous operational and management concerns of programme managers, is a precursor of medium- and long-term results. Improving programme monitoring is an urgent need in Africa and should be the first step in building the evaluation capacity of ministries of health.

* While desirable, amenability to measurement does not justify indicator selection in the absence of the previous two criteria.
Table 1: Criteria for malaria control programme policies and plans

<table>
<thead>
<tr>
<th>Policy</th>
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<tbody>
<tr>
<td>Does a written malaria control policy exist?</td>
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<tr>
<td>Does the malaria control policy reflect the national epidemiological situation?</td>
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<tr>
<td>Is the policy realistic given current resources for malaria control?</td>
</tr>
<tr>
<td>Does the policy include specific guidelines for disease management and prevention of malaria in the facility and at home?</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Programme plan</th>
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<tbody>
<tr>
<td>Does the programme plan include measurable objectives for programme processes, outcomes, and impact related to malaria control?</td>
</tr>
<tr>
<td>Do objectives reflect national malaria control policy and resource levels?</td>
</tr>
<tr>
<td>Are indicators included in the plan?</td>
</tr>
<tr>
<td>Does the plan include a description of major programme activities (e.g., training, supervision, etc.) to be implemented, including a timetable?</td>
</tr>
<tr>
<td>If implemented as planned, are activities likely to lead to the achievement of stated programme objectives?</td>
</tr>
<tr>
<td>Is there a programme budget? Is it both specific and realistic given planned programme activities?</td>
</tr>
</tbody>
</table>

For process objectives, managers should select particular criteria or indicators that will provide evidence that the programme is being implemented as planned. Criteria often include evidence that activities have been completed, such as the publication of a training curriculum, the installation of a computer in the statistics unit, or the redesign of a supervisory system. Process indicators that can be monitored to track progress towards successful implementation might address the number of personnel trained, the proportion of needed posters that are printed and distributed, or the number of chloroquine tablets received at the central warehouse. Specific examples of process indicators are presented in Table 2.

**Programme outcomes**
Examples of possible outcome indicators are presented here for both disease management and malaria prevention; specific indicators will vary based on the objectives of individual country programmes.

**Disease management.** Disease management is a priority intervention in most countries in sub-Saharan Africa, because it represents the most direct and feasible approach to reducing malaria morbidity and mortality. Correct disease management is a complex process (9, 10): health providers must make a correct diagnosis; provide treatment in accordance with national guidelines; educate patients about compli-

Table 2: Process indicators for malaria control programme implementation

<table>
<thead>
<tr>
<th>Training</th>
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<tbody>
<tr>
<td>Proportion of health facilities with at least one currently practising health worker who was trained (or retrained) in malaria disease management in the previous 3 years.</td>
</tr>
<tr>
<td>Proportion of health workers trained in the past 3 years who report that training included supervised practice of malaria disease management.</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Supervision</th>
</tr>
</thead>
<tbody>
<tr>
<td>Proportion of personnel who report one or more visits by their supervisor in the previous 3 months.</td>
</tr>
<tr>
<td>Proportion of personnel supervised in the previous 3 months who report that the visit included observation of interactions with patients who had fever.</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Health information system</th>
</tr>
</thead>
<tbody>
<tr>
<td>Proportion of reports (facility-to-district, district-to-national) received within the required time period.</td>
</tr>
<tr>
<td>Proportion of district-level managers who report that they receive feedback on their health information system reports within 3 months of being submitted.</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Drugs</th>
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<tbody>
<tr>
<td>Proportion of antimalarial drugs ordered by peripheral facilities that were shipped out from the central storehouse.</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Health education</th>
</tr>
</thead>
<tbody>
<tr>
<td>Proportion of care givers who visited a health facility in the last 3 months and reported having the health worker explain how to administer antimalarial drugs at home.</td>
</tr>
</tbody>
</table>
ance with treatment regimens; and refer a patient when necessary. To achieve desired performance levels, facilities must have well-defined and understood procedures (diagnostic, treatment, and referral), adequate supplies and equipment, access to a laboratory for microscopic confirmation of malaria, if needed, as well as standard guidelines and drugs for disease management. In addition, health workers must manage their clinics efficiently and carry out needed administrative duties.

Similarly, appropriate disease management in the home requires that patients or care givers correctly recognize dangerous symptoms, take recommended action in initiating home treatment or seeking health services, and comply with the treatment regimen prescribed. Appropriate home management of disease, therefore, requires access to antimalarial drugs.

Sample indicators for case management are shown in Table 3. In Fig. 2, results collected in 1991 in a facility-based assessment of malaria disease management in Côte d’Ivoire illustrate how the use of outcome indicators can alert managers to specific operational problems. Here, for example, shortages of chloroquine in health facilities limited health workers’ ability to provide on-site treatment with antimalarial drugs; this evaluation allowed the authorities to take action and rectify the situation (11).

Malaria prevention. The three major strategies for the prevention of malaria include chemoprophylaxis, personal protection measures, and vector control. Sample outcome indicators for prevention objectives are presented in Table 4.

Programme impact
The evaluation of the impact of malaria control programmes on mortality and morbidity in Africa is hindered by the absence of a uniform case definition for malaria and by inadequate diagnostic and laboratory capabilities. Also, most malaria-related morbidity and mortality in Africa occur in the community and are not seen and reported through facility-based sentinel or routine surveillance systems (12). Despite these operational limitations, mortality- and morbidity-reduction goals remain important, and impact objectives should be included in national programme policies and plans. Until more meaningful impact measurements are possible, emphasis in programme

Table 3: Outcome indicators for the case management of malaria

<table>
<thead>
<tr>
<th>Provider performance</th>
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</thead>
<tbody>
<tr>
<td>Diagnosis:</td>
<td>Proportion of patients seen by the health provider and, meeting national diagnostic criteria for malaria, are diagnosed correctly.</td>
</tr>
<tr>
<td>Treatment:</td>
<td>Proportion of patients diagnosed with malaria by the provider who are prescribed treatment in accordance with national policy.</td>
</tr>
<tr>
<td>Patient education:</td>
<td>Proportion of patients diagnosed with malaria by the provider who are given an explanation of the treatment regimen.</td>
</tr>
<tr>
<td>Referral:</td>
<td>Proportion of patients seen by the provider and who meet national criteria for referral and are given an appropriate referral.</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Patient/care performance</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Recognition:</td>
<td>Proportion of care givers who state that a child with fever requires prompt treatment.</td>
</tr>
<tr>
<td>Action:</td>
<td>Proportion of children with fever seen in health facilities whose care givers report that the child was treated at home or taken to a health facility within 24 hours of fever onset.</td>
</tr>
<tr>
<td>Compliance:</td>
<td>Proportion of care givers of children seen for fever in a health facility in the past 2 weeks who report that the child completed the nationally recommended course of treatment.</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Facility resources</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Treatment guidelines:</td>
<td>Proportion of facilities that can produce a written copy of the national guidelines for disease management of malaria.</td>
</tr>
<tr>
<td>Supplies/equipment:</td>
<td>Proportion of health facilities having needed supplies and equipment (e.g., at least one thermometer in working order).</td>
</tr>
<tr>
<td>Referral:</td>
<td>Proportion of facilities in which providers can identify the closest referral facility.</td>
</tr>
<tr>
<td>Access to laboratory:</td>
<td>Proportion of facilities where microscopic confirmation of malaria is possible within 2 hours of request.</td>
</tr>
<tr>
<td>Drugs:</td>
<td>Proportion of facilities reporting that the stocks of antimalarial drugs present in the clinic during the past 3 months were sufficient to treat all patients appropriately.</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Home/community resources</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Drugs:</td>
<td>Proportion of patients who were prescribed antimalarial drugs who report that they know where to obtain a full treatment dose at a cost they consider affordable.</td>
</tr>
</tbody>
</table>
evaluation activities can be directed towards the careful assessment of intermediate outcomes of programme activities that are considered to be associated with morbidity and mortality.

Sample indicators of programme impact are shown in Table 5, with a particular focus on those that can be collected through routine sources. Programme managers are often more successful in interpreting impact data when multiple indicators are reviewed together. Frequently, available data on outpatient visits, hospital admissions, or deaths attributed to malaria are difficult to interpret individually but can be useful when interpreted together. For example, an increasing trend in the number of hospital admissions for malaria is more reliable if corroborated by a parallel increase in malaria outpatient visits (I3). A useful strategy for identifying and interpreting fluctuations in such indicator denominators is the use of “tracer diseases”, unrelated to malaria, as indicators of the sensitivity of the disease reporting system. If reported levels of the tracer disease remain constant while the malaria incidence rises, for example, this can suggest that increases in reported malaria reflect a real increase in disease rather than more complete reporting or changes in health services utilization. In this respect, chickenpox has been a useful tracer disease in Burundi and Rwanda (S.O. Foster, personal communication, 1993).

Table 4: Outcome indicators for malaria prevention

<table>
<thead>
<tr>
<th>Chemoprophylaxis</th>
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</thead>
<tbody>
<tr>
<td>Proportion of targeted women who report at delivery that they have completed a full course of chemoprophylaxis in accordance with the national policy.</td>
</tr>
<tr>
<td>Proportion of antenatal clinics having recommended antimalarial drugs for chemoprophylaxis in stock.</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Personal protection</th>
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<tbody>
<tr>
<td>Proportion of households targeted for use of impregnated bednets that report they have ready access to them.</td>
</tr>
<tr>
<td>Proportion of households targeted for use of insecticide-impregnated bednets that have at least one such bednet per bed (or local equivalent).</td>
</tr>
<tr>
<td>Proportion of targeted households with impregnated bednets in which there is physical evidence of routine bednet use.</td>
</tr>
<tr>
<td>Proportion of targeted households with impregnated bednets reporting impregnation during the past 6 months (or the prescribed interval between impregnations).</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Vector control</th>
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</thead>
<tbody>
<tr>
<td>Proportion of targeted households that are sprayed during a single spraying cycle.</td>
</tr>
<tr>
<td>Proportion of health/environmental control facilities with the following:</td>
</tr>
<tr>
<td>— insecticides selected in the national policy;</td>
</tr>
<tr>
<td>— sufficient spray pumps in working order;</td>
</tr>
<tr>
<td>— adequately trained staff; and</td>
</tr>
<tr>
<td>— adequate transport resources to complete previous spraying cycle, as reported by field personnel responsible for carrying out spraying.</td>
</tr>
<tr>
<td>Proportion of targeted households that report having received a message about source reduction during the past year.</td>
</tr>
</tbody>
</table>
Evaluation of national malaria control programmes

Table 5: Indicators of the impact of malaria control programmes

<table>
<thead>
<tr>
<th>Morbidity</th>
</tr>
</thead>
<tbody>
<tr>
<td>Patients diagnosed with malaria in public-sector facilities over 1 year.a</td>
</tr>
<tr>
<td>Proportion of children diagnosed with malaria among patients seen at public-sector clinics.b</td>
</tr>
<tr>
<td>Proportion of population reporting a febrile episode in the previous 2 weeks.</td>
</tr>
<tr>
<td>Patients with microscopically confirmed severe malaria seen in referral facilities over 1 year.</td>
</tr>
<tr>
<td>Proportion of children with severe anaemia among paediatric admissions in health facilities.b</td>
</tr>
<tr>
<td>Proportion of babies delivered in health facilities who have low birth weight (&lt;2500 g).</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Mortality</th>
</tr>
</thead>
<tbody>
<tr>
<td>Deaths following a malaria-like illness* occurring in facilities over 1 year.</td>
</tr>
<tr>
<td>Deaths following a malaria-like illness, confirmed microscopically, occurring in referral facilities over 1 year.</td>
</tr>
<tr>
<td>Proportion of all deaths in health facilities that follow a malaria-like illness.</td>
</tr>
<tr>
<td>Proportion of patients hospitalized with a malaria-like illness who die in the hospital.f</td>
</tr>
<tr>
<td>Number of children dying with severe anaemia in health facilities over 1 year.</td>
</tr>
</tbody>
</table>

a This and several other morbidity indicators are not expressed as proportions, as is desirable. The most useful denominator would be "the population served by the health facilities"; however, in most malaria-endemic countries population estimates are unavailable or outdated, utilization rates for health facilities may vary over time, and the resulting proportion would be imprecise.

b This indicator can be difficult to interpret because changes may be due mainly to a change in the denominator, which may be unrelated to malaria.

c More complete reporting is often available from public-sector than private-sector facilities. This may vary by country, and programme managers using this indicator will need to define the types of facilities to sample for indicator measurement.

d In this example, measurement of the indicator is limited to referral health facilities because they are most likely to have microscopes available and receive a major share of severe malaria cases.

e "Malaria-like" can be defined regionally or at country level, but might include fever alone, seizure, coma, or anaemia without other apparent cause.

f This indicator may reflect community beliefs and attitudes related to health system utilization, health worker performance, or quality of hospital procedures, as well as disease severity or outcome.

Management of programme evaluation activities

Like other components of malaria control programmes (e.g., training, supervision, distribution of commodities), evaluation must be planned and implemented through the use of sound management principles. Because evaluation may be a relatively new or unfamiliar element of many public health programmes, malaria control programme staff may have only limited experience in administering evaluation-related activities. Below we highlight key challenges in the management of evaluation. Over time, the experiences of national programmes should be documented and shared as the basis for identifying the most effective approaches.

Developing feasible evaluation strategies: where to start?

Most national malaria control programmes do not currently have the personnel or financial resources to design and implement comprehensive evaluations of their programmes. A practical approach to this problem is to proceed incrementally, beginning with what is possible now and gradually increasing evaluation activities as the programme develops. Programmes should strive to evaluate a few components well, rather than many poorly or not at all.

Malaria programme managers in Africa may want to focus their short-term evaluation efforts on the process and outcomes of management of the disease in public-sector health facilities, which is the priority intervention in most countries of the continent. From an evaluation perspective, focusing on the quality of case management in facilities is advantageous because there are relatively inexpensive and straightforward methods for observation-based assessments of the quality of disease management that have been used successfully to evaluate primary health care services, including malaria, by ministries of health in Africa (14, 15).

A small number of indicators useful to managers at each level of the health system should be identified in an overall plan for evaluation. The plan should specify the data sources and how often the indicators will be measured. Priority indicators will vary from country to country, based on their programme plans and specific objectives; one such set of indicators for a country-specific plan is presented

in Table 6. This plan focuses on case management and on the use of routine sources of indicator data whenever possible. In some countries, supervisory systems may not provide adequate data on health worker performance; in others, indicators of referral may be more important than those reflecting diagnostic performance. Managers should systematically select the indicators appropriate for their programme as a part of the planning process.

**Developing an administrative structure for evaluation**

There is no single correct administrative structure for programme evaluation at the national level. Managers should build on existing organizational resources and the experiences of other countries and disease programmes to design a functional system. In Nigeria, which has 30 states and 589 semiautonomous districts, the federal Ministry of Health has developed a national monitoring and evaluation unit for primary health care. This unit is charged with designing an evaluation plan, testing it in selected geographical areas, developing forms, and training personnel (16). This level of investment, decentralization, and integration across programmes may not be possible or desirable in other countries. In the Central African Republic, involvement of district-level personnel in the definition of standards for disease management has led to the incorporation of outcome indicators into standard national supervisory checklists. The system is now being strengthened to support use of evaluation data for local-level monitoring before they are forwarded to the district and national levels for use in programme evaluation and replanning.

**Staff selection, training and supervision**

Programme managers need to select, train, and supervise the staff who will carry out evaluation activities. Such staff can be additional personnel dedica-

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**Table 6: Sample country-level evaluation plan for a malaria control programme**

<table>
<thead>
<tr>
<th>Priority indicator</th>
<th>Data source</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Process</strong></td>
<td></td>
</tr>
<tr>
<td>Proportion of health facilities with at least one currently practising health worker who was trained (or retrained) in malaria disease management in the previous 3 years.</td>
<td>Training records</td>
</tr>
<tr>
<td>Proportion of personnel who report one or more visits by their supervisor in the previous 3 months.</td>
<td>Facility-based assessment</td>
</tr>
<tr>
<td>Proportion of health information system reports (facility to district, district to national) received within the required time period.</td>
<td>Records of health information system</td>
</tr>
<tr>
<td>Proportion of health facilities with at least one copy of the national malaria policy.</td>
<td>Supervisors’ reports/ facility-based assessment</td>
</tr>
<tr>
<td><strong>Outcomes</strong></td>
<td></td>
</tr>
<tr>
<td>Proportion of patients seen by the health provider and, meeting national diagnostic criteria for malaria, are diagnosed correctly.</td>
<td>Supervisors’ reports/ facility-based assessment</td>
</tr>
<tr>
<td>Proportion of patients diagnosed to have malaria by the provider and who are prescribed treatment in accordance with national policy.</td>
<td>Supervisors’ reports/ facility-based assessment</td>
</tr>
<tr>
<td>Proportion of facility directors who report that stocks of antimalarial drugs present in the clinic during the past 3 months were sufficient to treat all patients appropriately.</td>
<td>Supervisors’ reports/ facility-based assessment</td>
</tr>
<tr>
<td>Proportion of patients diagnosed to have malaria by the provider and who are given an explanation of the treatment regimen.</td>
<td>Supervisors’ reports/ facility-based assessments</td>
</tr>
<tr>
<td>Proportion of children with fever seen in health facilities whose care givers report that the child was treated at home or taken to a health facility within 24 hours of fever onset.</td>
<td>Intake interviews</td>
</tr>
<tr>
<td><strong>Impact</strong></td>
<td></td>
</tr>
<tr>
<td>Patients diagnosed with malaria in public-sector facilities over 1 year.</td>
<td>Health information system</td>
</tr>
<tr>
<td>Proportion of children diagnosed with malaria among patients seen at public-sector facilities.</td>
<td>Health information system</td>
</tr>
<tr>
<td>Deaths following a malaria-like illness occurring in facilities over 1 year.</td>
<td>Health information system</td>
</tr>
</tbody>
</table>

* This plan, and the indicators selected, are for purposes of illustration only. Priority indicators must be selected by managers based on programme objectives, resources available for measurement, and level of programme development.
* Should be performed annually.
* Should be performed quarterly/annually.
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ted to evaluation or existing personnel whose responsibilities are modified to include evaluation duties; too often, however, evaluation tasks are added to the responsibilities of already overburdened staff, with little additional training or support.

Concrete actions should be included in the programme plan to ensure that evaluation activities are implemented, such as:

— developing or modifying job descriptions to include the evaluation tasks of data collection, management, analysis, use, and feedback;
— training staff to carry out evaluation tasks needed at different levels of the health system; and
— developing and implementing a strategy to ensure supervision of evaluation responsibilities, including on-the-job observation and feedback.

**Data quality control strategies**

Programme managers must ensure the quality of evaluation results. This can be accomplished by periodic reviews, auditing of records during supervisory visits, or special quality control activities (e.g., re-interviews with random subsamples of survey respondents). Developing quality assurance mechanisms will be a critical challenge in most countries because of shortages of staff trained in research methods and analytical skills.

**Data management and communication**

Evaluation data obtained from different sources must be systematically transformed into accessible and useful information and presented to managers at different programme levels. This requires skills in the management of quantitative data, assessment of data quality, communication, and planning. Because most programmes will draw their evaluation data from a variety of sources, it may not always be possible to have those individuals who collect and analyse the original data perform all the analyses needed for evaluation purposes. To facilitate this integrative process, these tasks should be assigned to a specific individual or organizational unit. To perform effectively, this unit needs the managerial authority to request timely submission of data and to work with individuals in other programmes to coordinate data access and use. The unit should also be an active participant in programme review and replanning activities, to ensure that information is correctly interpreted and that additional data needs are incorporated into the evaluation plan.

**Evaluation results in programme decision-making**

Even the best evaluation data are worthless unless the resulting information is used in making program-me decisions. Sometimes evaluation data are not used because they are made available to decision-makers too late or in a form that does not directly address the decision to be made. Even when timely and appropriate data are available, other factors (e.g., political considerations, individual skills and experiences, administrative and organizational arrangements) may limit their use in decision-making. One purpose of evaluation is to improve the decision-making process by assuring that available data are used. This can be accomplished in a variety of ways, including participation by the evaluation staff in programme review and planning activities, preparation of specific data summaries for review by programme planners, and by holding regularly scheduled meetings between managers and evaluation personnel to share information and discuss needs. National malaria control programmes should develop both a mechanism and a timetable for the review and revision of their evaluation plan.

**Conclusions**

Programme evaluation is essential to improving the quality and effectiveness of malaria control programmes in Africa. The first step in the development of appropriate evaluation activities is to incorporate an evaluation strategy into the programme planning process. This strategy should include a limited set of criteria and indicators with which to evaluate the process and outcomes of one or more priority programme objectives. For example, the adoption of criteria for the evaluation of malaria control policies and plans, together with the selection and use of a limited number of indicators of the process and outcomes of malaria disease management in public-sector facilities are within the reach of most African countries.

For evaluation to lead to improvements in malaria control programmes, it must be clearly defined as a part of the programme management process. Managers can increase the yield from their programme evaluation activities by working collaboratively with other countries and with regional and international agencies to define appropriate guidelines, indicators and methods. A coordinated approach will conserve resources and allow comparisons among various approaches. Programme managers should lead this developmental process and ensure that evaluation activities produce the information they need to monitor and improve their programmes at reasonable cost.

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Résumé
Evaluation des programmes nationaux de lutte antipaludique en Afrique

Les insuffisances de la mise en œuvre des programmes de lutte antipaludique comptent parmi les facteurs responsables de l’aggravation de la situation du paludisme dans le monde. Pour s’attaquer à ce problème, il est possible d’adopter une approche structurée, axée sur le renforcement de l'évaluation des programmes dans le cadre d'initiatives récentes de promotion des soins intégrés.

On peut définir l'évaluation des programmes dans le domaine de la santé publique comme étant le recueil et l'utilisation systématiques des données en vue d'améliorer les programmes sanitaires et d'orienter l'attribution des ressources. L'évaluation vise ainsi à contribuer à la réalisation des objectifs du programme ; elle peut le faire lorsqu'elle fournit en temps utile des informations qui seront utilisées par les directeurs de programme lors de la prise de décisions concernant la conception des programmes, leur déroulement et l'attribution des ressources. Les résultats de l'évaluation peuvent être utilisés à tous les niveaux du système de santé, pour surveiller les activités et améliorer les services.

Les directeurs de programme ne peuvent élaborer une stratégie d'évaluation qu'après avoir défini les objectifs du programme et en avoir planifié les activités. Les indicateurs seront choisis en fonction de leur validité, de leur fiabilité, de leur aptitude à détecter des changements dans un laps de temps raisonnable à la suite de la mise en œuvre du programme, de leur facilité d'interprétation, et enfin de leur aptitude à indiquer les modifications à apporter au programme. De plus, seuls seront retenus les indicateurs qui peuvent être mesurés dans le cadre des ressources disponibles. Les directeurs de programme devront choisir un nombre limité d'indicateurs couvrant de façon aussi complète que possible les objectifs du programme tout en permettant d'assurer dans les délais voulus la collecte et l'analyse des données. Ils auront aussi à identifier les sources de données et à déterminer la périodicité de la mesure des différents indicateurs.

Les directeurs de programme devront sélectionner des critères ou des indicateurs pour les aspects suivants du programme : politiques et plans, modalités de mise en œuvre, résultat des interventions de lutte antipaludique au niveau de la prise en charge et de la prévention de la maladie, et impact du programme en termes de réduction de la mortalité et de la morbidité liées au paludisme. Les questions clés de la gestion des activités d'évaluation dans le cadre d'un programme national sont les suivantes : tenir compte de la nécessité de démarrer avec les ressources existantes et d'augmenter progressivement les activités ; explorer différentes options d'administration des activités d'évaluation ; recruter, former et superviser le personnel chargé des activités d'évaluation ; élaborer des stratégies de contrôle de la qualité ; assurer que la gestion et la communication des données se font d'une façon propre à favoriser une prise de décisions efficace au niveau du programme.

L'évaluation peut contribuer à la qualité et à l'efficacité des programmes de lutte antipaludique en Afrique, aussi bien dans l'immédiat que par le fait que les activités de lutte antipaludique sont intégrées dans une approche plus large axée sur la santé des enfants. Pour que l'évaluation conduise réellement à une amélioration des programmes de lutte antipaludique, il est indispensable qu'elle soit clairement définie comme partie intégrante du processus de gestion du programme, s'ajoutant aux évaluations plus traditionnelles réalisées par les donateurs et par des organismes d'évaluation externe. Les directeurs de programme peuvent tirer le maximum de profit de l'évaluation des programmes en travaillant en collaboration avec les autres pays et avec les agences régionales et internationales à l'élaboration de
Evaluation of national malaria control programmes
directives, d'indicateurs et de méthodes appro-priés. Une approche coordonnée permettra d'écono-

miser les ressources et de comparer les diver-

ses méthodes et interventions. Les directeurs de

programme devront conduire eux-mêmes ce pro-

cessus de développement afin que les méthodes
d'évaluation produisent l'information dont ils ont

besoin pour contrôler et améliorer leurs program-

mes à un coût raisonnable.

References
1. Brinkman U, Brinkman A. Malaria and health in

Africa: the present situation and epidemiological
trends. Tropical medicine and parasitology, 1991,


Health Organization, 1993.
3. Cronbach LS et al. Toward reform of program eval-


In: Lampet P, Piot P, eds. The handbook for AIDS

prevention in Africa. Durham, NC, Family Health

5. Health programme evaluation: guiding principles for

its application in the managerial process for national

health development. World Health Organization,

Geneva, 1981 (Health for All Series No. 6).
6. Breman JG, Campbell CC. Combating severe


7. Campbell DT, Stanley JC. Experimental and quasi-

experimental designs for research. Chicago, Rand

McNally, 1963.
8. Fisher AA et al. Handbook for family planning oper-

ations research design, 2nd edit. New York, Popula-


Organization, 1990 (WHO Technical Report Series

No. 805).
10. World Health Organization. Severe and complicat-

ed malaria. Transactions of the Royal Society of

Tropical Medicine and Hygiene, 1990, 84 (suppl. 2):

1–65.
11. Traore M. Evaluation de l'impact des formations et

des besoins en formation des personnels de santé.

Février 1991. Côte d'Ivoire, Ministry of Health and

12. Greenwood BM et al. Mortality and morbidity from

malaria among children in a rural area of the Gambia,

West Africa. Transactions of the Royal Society of

Tropical Medicine and Hygiene, 1987, 81:

478–486.
13. Greenberg AE et al. Hospital-based surveillance of

malaria-related pediatric morbidity and mortality in

Kinshasa, Zaire. Bulletin of the World Health Organ-


child survival services. Health policy and planning,

15. The evolution of PRICOR’s operations research

approach. PRICOR child survival report, 3(1), 1990.
16. Monitoring and Evaluation Division, Department of

Primary Health Care, Federal Ministry of Health.

Monitoring primary health care services in Nigeria.