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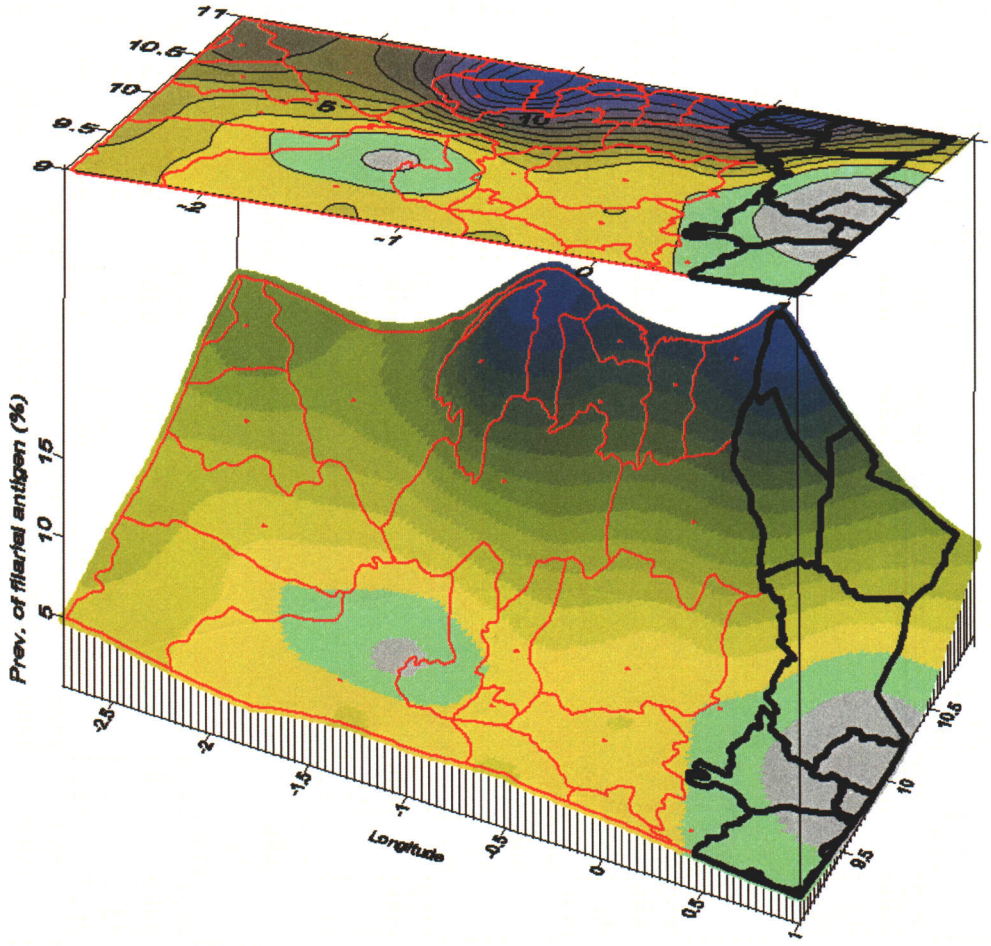
Operational Guidelines for Rapid Mapping of Bancroftian Filariasis in Africa



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held in Ouagadougou, 8-12 March 2000

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1 Introduction

Presently, there is inadequate information on the geographical distribution and burden of disease of lymphatic filariasis in Africa on which to establish elimination programmes. A recent review of published and reported filariasis surveys showed that only few areas, notably the East African coast and Madagascar, were well surveyed with respect to infection prevalence. Information on the distribution of filariasis is a pre-requisite for advocacy and planning for filariasis elimination programmes. This has become increasingly evident during several meetings during 1999, culminating in the joint OCP and APOC board meeting to discuss possible synergism between the programmes for elimination of lymphatic filariasis and the onchocerciasis control programmes. The urgent need to better understand the geographical distribution of lymphatic filariasis in Africa is recognised by all concerned and mapping the distribution of the disease is a top priority as prerequisite for action against lymphatic filariasis[1].

This document provides operational guidelines for rapid mapping of lymphatic filariasis in Africa. A standardized methodology for rapid mapping of lymphatic filariasis has been developed, based on previous work on rapid mapping (section 3) and extensive consultation with partners on the optimal approach. The last stage in the consultative process was an inter-country workshop with participants from the Ministries of Health of 7 African countries. The standard methodology, as agreed upon during the workshop, is described in section 4, and specific comments of the participants, based on their first experience with the method, are given in section 5. The final two sections of the document provide a proposal for the phased implementation of filariasis mapping in Africa.

2 Objectives

The objectives of rapid mapping of lymphatic filariasis in Africa are:

- To determine the geographic distribution of lymphatic filariasis in Africa
- To estimate the population at risk and the burden of disease by endemic country
- To identify and map the implementation units (e.g. districts or LGA's) where mass drug administration is required for filariasis elimination

3 Previous proposals for rapid mapping of filariasis

3.1 Development and pre-testing of RAGFIL

The TDR Task Force on Community-Directed Treatment of Filariasis completed in 1999 a multi-country study on the Rapid Assessment of the Geographical Distribution of Bancroftian Filariasis (RAGFIL)[2].

A workshop was first held to review spatial patterns of filariasis in sites for which detailed survey information was available. On the basis of this review, it was postulated that filariasis foci tend to be large with a diameter of at least 50 km. A rapid mapping method was proposed that uses a spatial sampling grid with 50 km between sampled villages. In the sample villages, rapid assessment surveys would be done to estimate the prevalence of lymphatic filariasis by hydrocele examination or antigen testing (using the ICT card test) in a sample of 50 adult males. Spatial analysis techniques would then be applied to analyse the spatial correlation pattern, determine the best fitting variogram model and use this model in kriging to estimate the prevalence contours of filariasis throughout the area to be mapped. Overlay of these prevalence contours with available population data in a GIS would allow the estimation of the burden of disease.

The proposed method was field-tested in 4 countries, Ghana, Tanzania, India and Myanmar. The testing was done in areas of 200 x 200 km, and involved a comparison of the estimated prevalence contours obtained with the 50x50 km grid sample with the results of surveys done in a much larger sample of villages selected using a 25x25 km grid. The study showed that (i) there was a highly significant spatial correlation between sample villages, confirming the existence of large filariasis foci, (ii) the prevalence contours obtained with the 50x50 km grid were operationally similar to those obtained with the 25x25 km grid, indicating that the 50x50 km grid was adequate for rapid mapping of filariasis, (iii) there was a strong correlation between the results obtained with the hydrocele examination and the ICT test in 3 of the 4 sites (India being the exception). The researchers recommended that the RAGFIL method be applied for rapid mapping of filariasis in Africa. They also suggested that a regional approach to mapping is used because of the importance of cross-border foci as demonstrated by the findings from North Ghana[3].

3.2. The Implementation Unit (IU) as the basis of sampling for LF endemicity

The second approach to rapid filariasis mapping was outlined in a WHO organised informal consultation of filariasis epidemiologists on Epidemiological Approaches to Lymphatic Filariasis Elimination[4]. The meeting was held at Atlanta, USA, in August 1998 and its purpose was to discuss issues relating to the initial assessment, monitoring and certification for lymphatic filariasis elimination.

The consultation recommended the following approach for initial assessment

1. The Ministries of Health should define the administrative level at which mass treatment will be implemented (ie., the administrative unit within which all residents would receive mass treatment- the implementation unit [IU]). The maps generated would be based on these implementation units, and so be consistent with the existing public health administrative system of the endemic country.
2. Using all available information, (including existing data on distribution of filarial infection and disease, data on the geographic distribution of vectors, and, if available, results of any blood surveys to document infection in specific area), all administrative units in the country should be categorised as to the likelihood of filarial transmission: Transmission present (or highly likely), Transmission possible but uncertain, or Transmission absent (or highly unlikely).

3. Actions for each category of IU can be planned as follows:
   - Transmission present: Mass treatment can be implemented after collection of base-line data on microfilaremia in sentinel sites, which will be used for longitudinal monitoring.
   - Transmission absent (or highly unlikely): No further action at this point. However, additional sampling may be warranted and "background surveillance" should be established that will detect previously unrecognised foci of transmission
   - Transmission possible but uncertain: These administrative units should be sampled for the presence of lymphatic filarial infection. A variety of sampling techniques and tools may be used, but recommended was the use of Lot Quality Assurance Sampling (LQAS) aimed at detecting a prevalence of $\geq$ 1%, using detection of circulating filarial antigen by the whole blood "ICT card test".

4 Standardized Method for Mapping Filariasis in Africa

A strategy and methodology for mapping the distribution of lymphatic filariasis in Africa has been defined on the basis of the recommendations of the informal consultation, the outcome of the multi-country RAGFIL studies, interaction with national representatives and other experts in Geneva, Accra and London, the review of epidemiological information for Africa, and the comments and recommendations of the participants in the inter-coutry planning workshop held in Ouagadougou. This method builds on the strength of having the implementation unit as the unit for sampling and integrates the spatial sampling and analysis approach of the RAGFIL, increasing the strength of the decision making process in chosing the IUs to be targeted for mass drug administration.

The method would use the following approaches to sampling, surveys and analysis for each group of countries where filariasis mapping is required.

Step 1: Identify or define the implementation unit (IU)

The first step in the mapping process will be to identify the unit of implementation of mass drug administration in the country. This unit would be the administrative unit for which the entire population would be targeted for mass drug administration once the unit has been identified as having filariasis transmission. This will be a country specific decision based on the size and extent of different administrative levels. In most countries the implementation unit would be the district.

Step 2: Review of available information on lymphatic filariasis

- The next step in the mapping process will be to identify the implementation units where mapping is needed. All available survey data would first be reviewed.

- On the basis of the review of the available data with regard to its being up to date and valid, the implementation units will be categorised as
  1. IU with presence of transmission (red areas)
  2. IU where there is no transmission or highly unlikely (green areas)

3. IU where transmission possible but status is uncertain (grey areas): further survey for filarial antigenaemia in sample population needs to be carried out to identify these uncertain areas as those with or without transmission

Step 3: Selection of sample villages for filarial antigen surveys

- For each IU classified as 'Transmission possible but uncertain', one sample village would be randomly selected from a list of the villages in the IU. The sample would be selected during the workshop with representatives of the countries concerned. The lists of villages would be prepared using the HealthMapper database and other appropriate geo-referenced databases.

- The sample villages, together with a buffer zone around each sample village of 50 km diameter, would be mapped. Remaining gaps would be identified and additional villages would then be selected to cover these gaps in the most cost-effective manner with the smallest number of sample villages.

- Where necessary, a country-specific decision on the minimum number of IUs that need to be sampled in areas where the districts/LGAs are very small in size and where sampling each unit would lead to huge number of sample villages (eg. Nigeria and Burkina Faso). However, this minimum number does not preclude additional sampling, if resources are available.

Step 4: Identify one "check" village in IUs where locally available information suggests that specific villages are likely to be endemic

- In some IUs, the District Health Office (DHO) may have additional information, such as frequent reports of hydrocoeles and lymphoedema, that strongly suggests that filariasis is endemic in specific villages. Before undertaking the survey, the survey team will visit the DHO and seek information, if available, on the villages which are most likely to be endemic. Such information should be based on either historic evidence or on the basis of reports of elephantiasis or hydrocele presence. The village most likely to be endemic according to the DHO will be selected as a possible "check" village. The name and location of this 'check' village should be noted down before undertaking the surveys in the IU.

Step 5: Undertake surveys in the sample villages

- Following the visit to the DHO, the survey team would carry out filarial antigen surveys in the sample villages, i.e. the randomly and additionally selected villages but excluding the 'check' villages.

- In each sample village, 50-100 adults (equal number of males and females, age >15 years) would be tested for daytime filarial antigenaemia using the ICT test cards. If among the first 50 adults tested, more than 20% are positive, testing can be stopped (precision of estimate about 10% with 95% confidence). Otherwise, testing would continue until a total of 100 adults have been examined. The percentage antigen positives would be the prevalence estimate for the sample village.

- If all the ICT tests for the randomly selected village(s) for the IU are negative, and if a "check" village, believed to be endemic according to the DHO, has been

selected for the IU in step 4, a survey would be done in this 'check' village using the standard survey methodology. This village should have been identified during the pre-survey visit to the DHO. If the prevalence was greater than zero in any of the randomly selected villages, the survey in the "check" village would not be required even if a "check" village had been selected in step 4.

Step 6: Data entry into HealthMapper

- The filarial antigen prevalence rate will be calculated and entered for each of the surveyed village in the data-base manager of HealthMapper

Step 7: Spatial analysis and preparation of a prevalence contour map

- Once the prevalence data is entered in the data manager, a prevalence contour map based on spatial analysis of the filarial antigen prevalence in the random sample of villages would be created.

Step 8: Identification of IUs where mass drug administration is required

- The prevalence contour map will be overlaid on the boundaries of the IUs. Based on the contour and the prevalence rate in the random or additional sample villages, the IUs will be identified which have transmission on the basis of having more than 1% antigenaemia. A second layer of all IUs identifying them as (i) those having transmission and thus to be targeted for mass drug administration [red] and (ii) those with no transmission or where transmission is highly unlikely [green] where background surveillance needs to be established

General principles of the mapping exercise:

- The MoH and the National LF Elimination Task Forces of the member countries would have 'ownership' of the LF mapping and would be integrally involved in the implementation. However, since spatial analysis would depend on data points in neighbouring countries and because of the importance of cross-border foci, a regional co-ordination would be necessary in implementing the distribution studies.

5 Experiences with the method during the first inter-country

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