



EXPERT COMMITTEE ON LYMPHATIC FILARIASIS

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COMMUNITY PARTICIPATION IN THE CONTROL OF LYMPHATIC FILARIASIS IN AFRICA

by

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1. THE PARASITE AND ITS VECTORS

Lymphatic filariasis in Africa is due to infection with Wuchereria bancrofti which occurs in most of the hot humid sub-Saharan region extending as far south as Mozambique. In Eastern Madagascar the parasite is W. bancrofti var. vauceli. The affected countries include Senegal, Gambia, Cape Verde, Mali, Upper Volta, Niger, Guinea-Bissau, Guinea, Sierra Leone, Liberia, Ivory Coast, Ghana, Togo, Benin, Nigeria, Cameroon, Sao Tome and Principe, Gabon, Chad, Sudan, Central African Republic, Congo, Zaire, Burundi, Uganda, Kenya, Tanzania, Malawi, Zimbabwe, Mozambique, Madagascar, Réunion, Mauritius, Comoro Islands, Seychelles and the Chagos Archipelago. Another focus is known in Egypt. Bancroftian filariasis is rare or probably absent in southern Africa, i.e. Namibia, South Africa, Botswana, Swaziland and Lesotho (Hawking, 1974).

In Africa bancroftian filariasis is mainly a rural disease principally transmitted by Anopheles gambiae s.l. and the An. funestus group. In urban areas, especially in eastern Africa (White, 1971) and the adjacent islands, the main vector is Culex quinquefasciatus which is now widespread in much of the Ethiopian region and the neighbouring islands (Hamon et al., 1967; Brunhes, 1975 and Lambrecht, 1971), although it is not a major vector throughout its range. Minor African vectors include An. welcomi in some parts of West Africa, An. coustani, An. mascarensis, and Cx. antennatus in Madagascar (Brunhes, 1969).

Most of the C. quinquefasciatus breeding habitats in Africa as elsewhere are man-made and include pit latrines, soakage pits, cesspools, septic tanks, drains, ditches and such artificial containers as water drums, cisterns, tin cans, broken bottles, tyres and coconut shells.

Man also promotes C. quinquefasciatus breeding when he pollutes water with a high content of organic matter, or uses chlorinated insecticides and detergents. C. quinquefasciatus is therefore a mosquito of urbanization, including densely populated village situations where waste disposal is poor. In many parts of Africa, especially in eastern Africa, over the last three decades, there have arisen unprecedented increases in C. quinquefasciatus populations with consequent enhancement of bancroftian filariasis transmission.

The anopheline vectors on the other hand breed principally in clean water. For An. gambiae s.l. a typical breeding site is a shallow open sun-lit pool with unpolluted water; recently flooded rice fields (especially with young rice) also comprise favourable breeding sites. The salt-water breeding sibling species of the An. gambiae complex breed in brackish lagoons, swamps, pools and puddles flooded at spring tides. The An. funestus group typically breed in bodies of clear water with emergent vegetation including older rice fields.

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2. COMMUNITY CONTROL OF BANCROFTIAN FILARIASIS IN AFRICA

Although bancroftian filariasis may attain high prevalence rates in some African localities there is a lack of records on major control programmes specifically targeted against it. Where vector control has been undertaken, the major target has been urban vectors of malaria; the control of culicines is for the most part aimed at reducing mosquito nuisance.

A major reason why mosquito control programmes in Africa have not been targeted against bancroftian filariasis is the ignorance of the general public and even many health personnel of the importance of the disease as a major cause of morbidity, and the role mosquitos play in its transmission. In a report on the early signs and symptoms of bancroftian filariasis in coastal East Africa, Wijers and McMahon (1976) observed that the disease "appears to be characterized by a lack of severe or acute signs of lymph vessel inflammation" and would therefore fail to arouse much public concern. The more prevalent late signs (viz. hydrocoeles) also being sex limited are more likely to arouse most interest within the affected age and sex group. Such other signs as elephantiasis are usually so rare in Africa that they are not likely to provoke community anxiety and are therefore unsuitable in mobilizing community involvement based on the solution of a felt major community problem. Studies in Tanzania showed that the general public is not aware of the role mosquitos play in the transmission of filariasis, but an association with a filariasis study team engrained an increasing awareness of mosquitos as general disease vectors and of hydrocoeles (Muhondwa, 1978).

As it is currently not very likely to create community-wide interest in filariasis vector control per se a solution might be found in linking mosquito control to other problems which constitute greater community felt needs. Malaria being a major community problem in these areas, filariasis vector control could be conveniently linked to malaria control in both urban and rural areas. Environmental sanitation constitutes another obvious example and emphasizes the importance of intersectoral linkages.

Compelling reasons for community participation in filariasis control in Africa include:

- the affected countries are economically poor, and the meagre resources available for mosquito vector control, which mostly go to fund untrained personnel (see Smith, 1982) would be released and stretched to cover such imported costs as insecticides, equipment, transport, expertise and the like;
- fully involved participants make emotional and material investments in the project, and would therefore ensure that it is undertaken, used and maintained properly; they would also avoid damaging it;
- building up confidence, self-reliance and self-determination in the community;
- exploitation of indigenous expertise.

True community participation in mosquito vector control should fully involve the majority of the community in the various aspects of the control programme, including thinking, planning, deciding, implementing and evaluating it. This participation can be achieved initially through consultations and reaching a consensus with all sections of the community or at least their representatives; extensive health education is therefore essential. The community after accepting the project, would be further committed through financial contributions, labour inputs, mass action and the like.

Since many mosquito-breeding sites are man-made it is essential initially to deal with such issues as community cooperation, community responsibility and man's behaviour as he creates potential breeding sites. The human behaviour needing study would cover his activities in creating breeding sites, in maximizing contact with biting vectors, in the use of certain insecticides and detergents, in water and refuse management, in house construction that may favour man-vector contact, and in urbanization and the creation of high human population densities (Dunn, 1974). Studies of such behaviour would be useful in formulating

motivational and educational strategies essential for eliciting behavioural changes and promoting community participation. In order to ensure community participation, the various vector control activities should be short-range undertakings contributing to the realization of long-term goals.

3. SUGGESTED COMMUNITY ACTIVITIES FOR THE CONTROL OF AFRICAN VECTORS OF BANCROFTIAN FILARIASIS

3.1 Appropriate technology

The mosquito control technologies worth considering for use in community participation in Africa should meet most of the following criteria (Kilama, 1979, 1982):

- the particular vector control technology can be made readily available;
- the skills involved in maintaining the vector control programme using this particular technology can be easily acquired;
- the capital expenditure for using the particular technology is not too high for the community;
- the proposed technology/approach benefits other local enterprises;
- the equipment, materials and agents needed for initiating and sustaining the vector control programme can readily be made available;
- the candidate vector control technology is safe to the environment;
- there is no excessive toxicity or other health hazards associated with the proposed measure;
- the proposed vector control method is compatible with the local human practices and attitudes;
- the approach is labour intensive, and can take advantage of community participation;
- the technology is well tested and of proven efficiency so that it is not likely to fail under prevailing local circumstances;
- the interest of the community can be sustained.

Due to financial, administrative and other constraints, vertical control programmes are no longer feasible in Africa. Most of the activities should be undertaken by the affected communities which should be provided with sufficient guidance, training, advice and supervision.

3.2 Personal protection

Personal protection is the more obvious approach to mosquito control based on community participation. It would, for example, involve the screening of houses with appropriate wire gauze on windows and doors, using bed nets, wearing suitable clothing and where possible siting houses away from mosquito breeding habitats - in the case of An. gambiae s.l. 2 km is recommended. Chemical methods of personal protection would utilize repellents and interior space treatment (containing pyrethrum which is mostly produced in Africa). The burning of "mosquito coils" is popular in East Africa. However obvious is personal protection it must overcome established norms of human behaviour and practices; poverty is a very major hindrance. Kolstrup working in Tanzania was able to prevent Culex and Anopheles from entering sleeping rooms in ordinary village huts by installing ceilings, doors and screening windows.

3.3 Environmental control and source reduction

The environmental control of C. quinquefasciatus would centre on preventing man from creating potential breeding habitats. The building of latrines that do not breed C. quinquefasciatus even in high ground water-table areas (Winblad & Kilama, 1980), the timely repairing of septic tanks, and soak pits, the prevention of pool formation, the proper disposal of sewage and sullage, the covering of water containers with tight fitting lids, would all go a long way towards minimizing Culex breeding. Used containers should be destroyed, and vehicle tyres could, for example, be turned into sandals. Community sanitation consisting of biannual campaign of source reduction in premises and their surroundings in Dar es Salaam proved to be sufficient to significantly reduce the Culex house index (Bang et al., 1975). Curtis and Hawkins (1982) and Curtis et al. (1983) reduced C. quinquefasciatus numbers by installing and maintaining exit traps in latrine ventilation pipes in Dar es Salaam. Similar results were obtained in Gaborone, Botswana. Mosquito gauze should always cover ventilation pipes, whenever on-site sanitation facilities are installed (Morgan & Mara, 1982).

Well motivated communities may effectively undertake filling, providing or removing shade, removal of marginal vegetation, and the clearing of drains and canals for the control of Anopheles sp. A mounting problem in Africa is the breeding of both An. gambiae s.l. and An. funestus in rice fields where environmental control methods should include detailed planning of drainage systems and intermittent irrigation. The latter would necessitate close collaboration with agriculturalists.

Zooprophylaxis would hold promise where the mosquito vector species manifest definite zoophilic tendencies.

3.4 Chemical control

The frequently recommended major measure of Anopheles control in rural areas of Africa is intradomiciliary spraying with residual insecticides. DDT wettable powder is the preferred chemical, although others have been tested especially where exitorepellency and/or DDT resistance exist. A very major consideration in the use of this method is the toxicity of the chemical to man (and other nontarget organisms). Intradomiciliary spraying using village volunteers, especially the youth, has been utilized in pilot malaria control projects in Tanzania, Guinea and Mozambique, although its efficacy has not been adequately evaluated. In Ethiopia intradomiciliary spraying by volunteers in malaria control is widespread and seems to be effective. The effect of this national programme on filariasis transmission deserves evaluation.

Space spraying inside houses is effective in controlling flying insects for the life of the aerosol effect which at best is only a few hours. This approach is popular, especially in urban areas and among the more affluent village communities.

Residual spraying against Culex is problematic since these mosquitos are naturally tolerant to organochlorine insecticides and the imago does not always rest on walls. The use of space treatment is characterized by high costs, which may be beyond the financial capabilities of most affected communities.

Some larviciding especially where extremely safe insecticides (e.g. temephos) are used can be undertaken by the community. In this case too, close supervision is essential and must ensure non-contamination of potable water and green vegetable gardens; it must also not affect such valuable fauna as fish. In this regard it would be beneficial to exploit the insecticides used in rice fields for mosquito control.

The larvicidal insecticide used most in the control of C. quinquefasciatus in eastern Africa is chlorpyrifos (Dursban). This chemical is too toxic to be used by community volunteers; moreover many strains in eastern Africa are already manifesting considerable Dursban resistance (Curtis & Pasteur, 1981).

3.5 Biological control

Larvivorous fish are the organisms often used in the biocontrol of mosquitos. These include Gambusia sp., Lebistes sp., Cyprinus sp. and Poecilia sp. Lately Oreochromis spirulus spirulus (previously wrongly cited as Tilapia zilli) have shown great promise in Somalia in the control of An. gambiae s.l. breeding in delimited breeding habitats. Community maintenance of fish ponds, and their distribution to appropriate breeding sites have been initiated in Somalia.

Bacillus thuringiensis H-14 is being field tried in several African countries, and its safe record makes it a potential candidate for use in control programmes involving community participation.

3.6 Integrated control

The control of either of the African vectors of lymphatic filariasis should not totally rely on any single control measure. It should utilize all appropriate technological and management techniques in optimum combinations in order to achieve cost effectiveness. In this regard integration with mass chemotherapy (e.g. with DEC) should be given very serious consideration.

In Africa as elsewhere much still needs to be learned concerning community participation in vector control. Moreover, precise answers will usually be appropriate for localized situations.

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