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THE PREVENTION OF DENGUE FEVER

SOUTH PACIFIC COMMISSION
NOUMEA, NEW CALEDONIA

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PREVENTION OF DENGUE FEVER

A manual for public health staff, nurses, health educators and community development officers

by
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with revisions

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SOUTH PACIFIC COMMISSION
NOUMEA, NEW CALEDONIA

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PREFACE

Dengue fever is a very common disease in the Pacific area. As the outbreaks of this disease tend to be explosive, a number of countries have not been prepared, nor equipped, to face them. The limited number of personnel, their lack of training and the fact that the disease is difficult to control, make the situation still more difficult to cope with. There is no vaccine or curative medication available. Thus prevention of dengue fever rests entirely on the control of the mosquito vectors. This is primarily a community responsibility.

Simply providing information about the disease seldom results in a change of people's habits and practices.The information must be applied. This manual, while providing a review of facts about dengue, concentrates on the preventive measures which can be undertaken. It highlights health education and community activities. These can be carried out by health personnel engaged in prevention, control and treatment and by community workers involved in health, education or social services.

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WHY ACTION IS NEEDED

In some dengue epidemics, severe and even fatal cases occur. Dengue is a disease which can produce symptoms like those of other diseases such as measles, influenza, etc. It is caused by a virus carried by mosquitoes from a sick person to a healthy one.

Because of the explosive character of a dengue fever epidemic, it can create serious economic problems. An outbreak creates a sharp slowdown of economic activity due to a very high rate of absenteeism. In the Pacific region, where tourism is one of the main sources of income, a dengue epidemic tends to frighten tourists away for several months at a time.

While prevention may cost money, this expenditure is minor compared to the costs of an epidemic. In a dengue fever epidemic the costs are both direct and indirect. They include cost of treatment, absenteeism and decreased efficiency at work, additional burden on health facilities, emergency vector control measures (airplane and truck spraying) and possible unknown effects of dengue (such as congenital malformation and abortion).

The usual mosquito vector, *Aedes aegypti*, which carries the dengue virus, is the same one which carries the yellow fever virus. *Aedes aegypti* and related mosquitoes that can transmit dengue are found throughout the Pacific. With the increased air traffic round the world, there is also a risk that yellow fever and other similar viruses might be introduced into the Pacific region. The Pacific has not yet been exposed to many of these viruses. An epidemic of a new introduced disease might cause high death rates.

THE SYMPTOMS

The symptoms of dengue can range from no symptoms at all, to a mild fever, to a serious illness with bleeding that can cause death.

Other symptoms may include:

— Sudden high fever (which may disappear after 3—4 days, only to reappear later)

— Pains in muscles and joints

— Severe headache and backache

— Pain on moving the eyes

— A rash, with or without itching

— Loss of appetite and weakness, with unusual taste in the mouth.

Recovery is usually complete, but weakness and depression may linger on for several weeks.

In addition to the above symptoms a more severe form of the disease, which is called dengue haemorrhagic fever, may also show one or more of the following:

— skin bleeding (haemorrhage)

— nose and gum bleeding, blood vomiting, blood in stools, severe menstrual bleeding

— some patients go into a state of shock (rapid and very weak pulse, with cold skin and restlessness)

— loss of blood and body fluids, loss of consciousness.

Patients in shock are in danger of dying if the right treatment is not given immediately given. A patient with shock may die within 12—24 hours, or recover rapidly if the right anti-shock treatment is provided. With proper treatment, including large amounts of fluids given by doctors and other health professionals, most patients recover completely.

HOW THE DISEASE IS SPREAD

When a person is sick with dengue, he carries the virus in his blood for about one week. If the right mosquito (the *Aedes* type) bites him during this period it gets the virus along with his blood. The virus multiplies in the mosquito and reaches its salivary glands. This takes about 8—14 days. From then on the mosquito carries the virus and is infectious for the rest of its life (which may be more than three months). Each time it bites a susceptible person, it gives that person the virus, and the symptoms start to appear after 5—15 days.

THE *AEDES AEGYPTI* MOSQUITO

Aedes aegypti is a mosquito which is closely associated with man; it breeds in man-made water containers and lives in and around houses and man-made shelters. As a result the most effective control measure is to eliminate breeding sites for these mosquitoes.

Breeding habits

The female mosquito needs to feed on blood before it lays its eggs (once every 4—7 days)

Three days after taking blood, the female lays about 100 eggs at the edge of the surface of water that has collected in the following places:

— old tyres
— empty tins
— storage drums
— roof drains and gutters
— buckets, bottles, pots, pans
— flower pots and vases
— coconut shells
— boats, canoes, etc.

The eggs develop into larvae which live for a few days in water, then become adult mosquitoes. Only female mosquitoes are able to take blood. They take their first blood meal four days after they become adult, and continue to bite man and take blood about once a week until they die.

The mosquito population increases during the rainy season. Eggs are deposited on the wet sides of a container and can remain alive for many weeks until the water level increases in the container (when it rains, for example); then they hatch into larvae.

Even if the container is emptied, a large proportion of the larvae may remain in small amounts of water left in the bottom and some may survive. Containers should therefore be carefully cleaned and turned upside down.

Resting habits

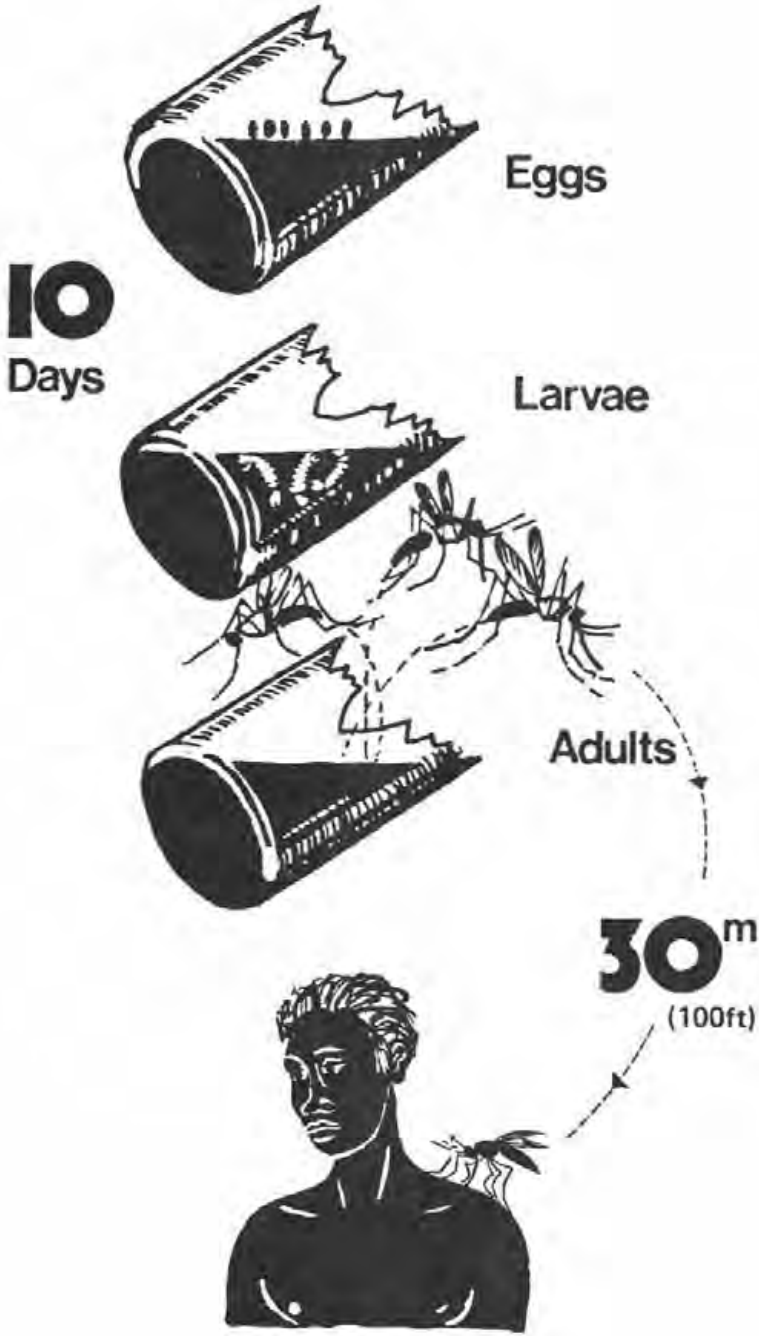
The mosquitoes avoid light and seek resting-places that are sheltered from the sun and the wind. That is why they are usually found in dark corners inside houses as soon as they can fly. In a room, they are found under the furniture, behind pictures, in clothes, etc.

The mosquito flight range is not far (usually not more than 30 metres).

Biting habits

The *Aedes aegypti* bites man mainly in the early morning and early evening before bed-time (so the use of mosquito nets does not provide protection).

Spraying inside houses (as in malaria control) does not eliminate the dengue problem. The mosquito which carries malaria (*Anopheles*) is different from the mosquito which carries dengue fever (*Aedes aegypti*).



Life cycle of mosquito

WHAT CAN BE DONE?

A. CURATIVE MEASURES

As there is no specific treatment available to cure dengue (apart from the giving of fluids, rest and avoiding aspirin) the control of any type of dengue fever outbreak depends on reducing the mosquito population. As *Aedes aegypti* is the most common carrier of the dengue virus and it is present on most of the Pacific Islands, any control measures should take into consideration the behaviour pattern of this mosquito.

B. EMERGENCY PREVENTION

Emergency prevention relies mainly on the use of chemicals. These can be of two kinds:

— Larvicides (which kill mosquitoes before they become adult)
— Adulticides (which kill adult mosquitoes).

Decisions about which kinds of products to apply, and how, when and by whom they will be applied, are usually the responsibility of the health department in association with sanitary engineers, rural development officers, etc.

C. IMPORTANT ROUTINE PREVENTIVE MEASURES

These consist of long-term, team-work efforts, by people in the community health and education departments and local authorities.

This preventive action consists mainly of environmental sanitation, backed up by public health education and legal measures.

It is focused on finding and eliminating mosquito breeding sites, at least once a week, within a 30 metre (100 foot) radius from each home or living-place.

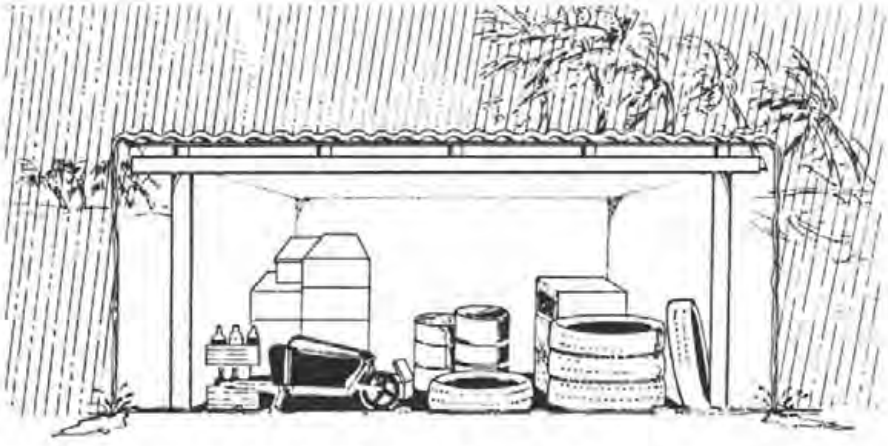
(1) How to eliminate mosquito breeding sites

1. Clean the bush and plantations. Fill in any holes (for example, in mango trees and holes dug by crabs).

2. Drain puddles and stagnant water or pour kerosene or old car oil onto stagnant puddles which cannot be drained.

3. Pierce and crush empty tins.

4. Put garbage and crushed tins in a hole. Cover with a layer of earth or sand, or protect hole against rain with corrugated iron.

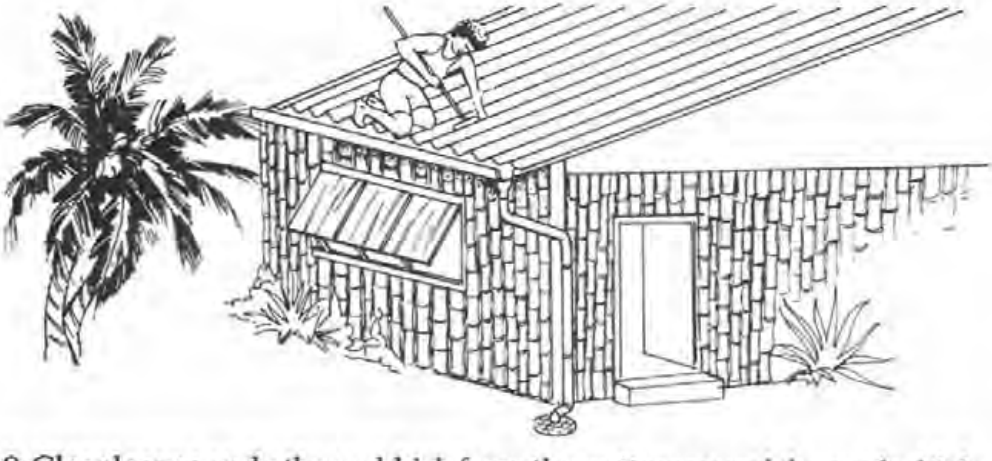


5. Don't leave empty tins, bottles, buckets and drums around. Turn them upside down to stop them filling with water. Remove any old tyres.

6. Once a week, change the water in flower-vases.

7. Once a week burn all coconut shells and any coconuts that have been opened (for drinking, for example).

8. Empty canoes and turn them upside down.



9. Clear leaves and other rubbish from the gutters round the roof which may trap water.

10. Check very carefully all grease traps, soakaways and septic tanks. Make sure they are really tightly closed. Fill in any holes and cracks around the top of septic tanks, etc.

(2) How to organise an educational campaign

In any campaign, you first plan, then carry out the campaign, then evaluate the results. Careful planning takes time but helps to ensure success. Local leaders should be involved in the planning process right from the start.

a) Analyse the situation

Before you start the campaign, you should know the facts about the problem you are dealing with (number of cases, etc.) and the practice you want the people to adopt (details of recommendations, etc.). This requires very close co-operation with members of the health profession (doctors, sanitary engineers, health inspectors) and the education department. You also have to know exactly to whom you should direct the campaign (all the population, a certain district, one island, etc.). To determine the scope of the campaign, you need to find out where the majority of the cases are coming from and if there is a risk of the epidemic spreading throughout the country.

b) Know your community and its practices

Who are the leaders or the 'key' individuals? These may include political, religious or business leaders who are capable of motivating other community members for action. Success in any community-based action lies in the early identification and involvement of those persons within the community who can be described as early adopters, political motivators, service-oriented leaders. These are the community members most prepared to consider, accept and work with new information and ideas provided from outside.

If key individuals are given an adequate understanding of the disease and the problems in its control, they will make appropriate changes in their own personal attitudes and behaviour. Once they appreciate that responsibility for change rests on their shoulders they can influence and assist their fellows in many ways that are closed to outsiders. As primary health educators, these responsive and highly motivated individuals have the power to spread the message effectively through the community.

c) Select a practice to promote

After careful study, you may find many things need to be done. However, you must select one practice to be given priority in the campaign. The recommended practice should fit in with the the people's capability and culture. For example, you should make sure there are garbage disposal arrangements before you undertake a general clean-up campaign. (In French Polynesia, Saturday was chosen as 'mosquito-control day' as Saturday is the usual big clean-up day in families there).

d) Establish objectives

Once you decide on the practice to be promoted, establish clear-cut objectives. Decide exactly what change you expect to be made and who is to make the change. A campaign should not merely aim at informing and arousing the interest of the public; it should motivate people to act.

e) Plan for evaluation

As you plan the campaign, also plan how you will evaluate it in terms of the objectives you set. Plan regular times and specific methods for checking on progress. Evaluation criteria have to be set before the campaign is launched. Evaluation can aim to measure knowledge about the campaign (information received) and the change in practices. In French Polynesia, one criterion chosen for measuring the effectiveness of an educational campaign to reduce mosquito breeding sites was the number of *Aedes aegypti* bites recorded per man per hour.

Evaluation helps you judge how well a campaign worked and therefore to plan future campaigns.

f) Schedule events

Write down a plan for events before you start the campaign. The plan should:

— be detailed and specific

— give you a time-table for systematic work-activities for the first, second, third week, etc.

— assure continuity of teaching effort.

— bring in appropriate leaders and professionals at the right time.

g) Prepare educational materials and supplies

It is wise to prepare such materials as audio-visual aids, pamphlets, posters, booklets, etc., and to collect necessary equipment for showing slides, films, etc., well in advance of the event. A last-minute rush is worrying for the organiser and irritating for all concerned. Preparation of educational materials should include pre-testing for clarity. Most people learn only one thing at a time. A well-planned campaign does not present too much for them to learn. Thus it does not demand too much change in their habits all at once. With only one idea at a time, the public will have time to try the new practice and experience success.

(3) Conducting the campaign

a) Launching the campaign

The first step is to inform and arouse the interest of the public as quickly as possible. Several mass communication media have to be used at the same time in order to reach as many people as possible within a short period of time.

Having a dramatic start will focus attention on the problem. You can organise a live broadcast (on T.V. or radio), with important political and technical people taking part, or you can organise a large meeting, inviting everyone who is interested. You can invite important and influential personalities to be on your organising or co-ordinating committee.

Involve as many news media people as you can. Invite T.V. and radio announcers to participate. Include newspaper reporters.

b) Communicating information

The following media can be used to put across specific information:

— Interviews or panel discussions with

- political leaders (on the importance of the problem)
- technical people, such as doctors (to explain the cause and effect of the problem)
- community members who have taken an active part in the campaign (to motivate other people for action)

— Questions and answers from the public (answers can be given by technical people to guide the public about what should be done)

— Spot announcements on radio and T.V., in newspapers (as reminders of basic messages)

— Messages from various political, religious and other influential leaders in the community on the importance of participation

— Messages from local authorities on progress made, etc.

— Songs especially composed for the campaign

— T.V.	Films taken locally to show what could be done Demonstration of things to do
— Newspaper	Illustrated articles Spot announcements
— Leaflets	Information leaflets in local languages with clear illustrations on methods of mosquito control
— Slides	Photographed locally to show what can be done, how it should be done and the result of neglect.

c) Motivating the public

In a dengue fever campaign, the public may be motivated by fear. It is important to keep in close touch with different categories of the public to stir them into action. The general public can be divided into several categories:

(i) The school population

With the collaboration of the principals and the teachers, an educational campaign in the schools can lead to active participation students and staff. A clean-up campaign in the school itself and the neighbourhood can provide a leading example for the community. Information learnt in school can be carried home, if it is presented in an attractive and practical way.

(ii) The general public

The general public can be reached through the classical mass media (radio, T.V., newspapers, posters, pamphlets, etc.). However, these can only provide information. As a follow-up, and to motivate people for action, a number of other methods can be utilised.

Meetings with special groups

Church groups, women's groups, youth groups, professional groups, parent-teacher associations, members of voluntary groups and associations, people living in the same district, village or town, etc., can be brought together. Some meetings may be convened especially to explain and demonstrate how mosquitoes transmit the disease and how breeding sites can be eliminated. The same message can be injected into meetings held for other purposes (for example, co-operating with the pastor or the priest to take the opportunity of a prayer meeting to give a demonstration).

Home visits

Health inspectors, district nurses, municipal workers, volunteers can all be trained to use home visiting as an educational tool to explain to the home-owner what he could do to get rid of mosquitoes.

Exhibits

These are a good way to explain the cycle of transmission of the disease, and to demonstrate that the mosquito is more than a nuisance – it carries a disease. Various types of mosquitoes can be presented. A microscope can be very effective in explaining the life cycle of the mosquito. People do not associate mosquito larvae with the adults nor mosquitoes with the disease. The use of the microscope attracts people's attention and curiosity. A mosquito breeding site can be shown. Exhibits can be set up in markets, schools, meeting-places and can be moved from one place to another.

Competitions

Competitions between villages, schools, etc., can be organised to promote action among the people. They should be carried out in co-operation with the village chiefs, school principals, mayors, etc.

Publicity

Posters can be used to remind people of the practice being recommended.

Wall journals can help to arouse interest.

Radio, T.V., newspapers, should be used to highlight successful efforts. Interviewing members of the community who have participated could incite others to do the same.

d) End the campaign dramatically

Set a definitive time to end the campaign and invite an important person to close it. This is a good time to report results to the people. It is also an occasion to recognise community leaders and members for their work.

e) Evaluate results

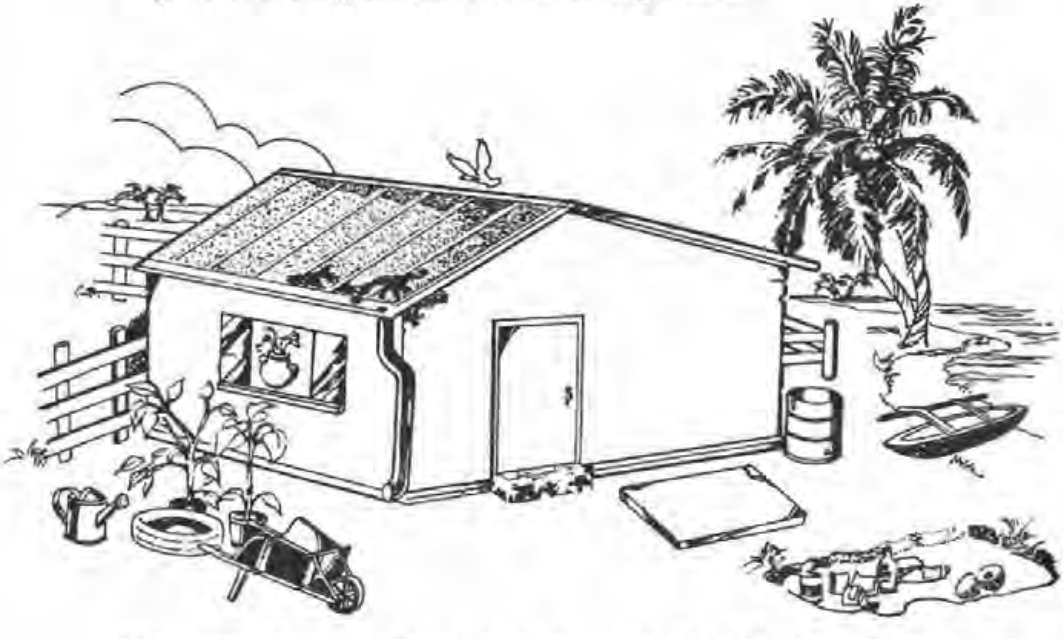
Try to determine by various means not only the number of people or groups who have participated, but also which campaign methods were most influential. Ask leaders and members of the campaign committee for their opinions on the effectiveness of the campaign, and for suggestions for improving future campaigns. Getting information, suggestions and opinions from a variety of people will reveal flaws in planning and carrying out the campaign that you can avoid in future campaigns.

Some basic messages which can be used in a campaign

The content of an education programme should aim to:

— Educate the public to recognise various types of mosquitoes and the diseases they transmit.

— Motivate the public to adopt simple measures of prevention and control through the recognition and elimination of mosquito breeding sites in homes and gardens.



How many mosquito breeding sites can you find in this picture?

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