

Dengue fever larval control in New Caledonia: assessment of a door-to-door health educators program

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Abstract
This article describes the assessment of a door-to-door community education program designed to promote larval control of Aedes aegypti, the vector of dengue fever in New Caledonia. This program took place in the Territory's Southern Province over a period of nine months beginning in November 2003. The agents, hired for their communications abilities, were given training about dengue fever and in communications and they were then supported and assessed right through to the end of the program. A two-part assessment made it possible to verify the quality of the agents' work and its impact on the population's behaviour towards larval breeding areas over time.

No difficulties were encountered applying the communications techniques in the field and the percentage of dwellings with potential breeding areas decreased significantly after the agents' visits, an impact that was maintained at least three weeks afterwards. (PHD, 2005 Vol 12 No 2 Pages 39 - 44)

Introduction

In 2003, New Caledonia was affected by a serious DEN-1 epidemic (more than 5500 reported cases, 17 deaths) at a time when the vector mosquito were showing signs of emerging resistance to deltamethrine, the insecticide used for both prevention and in connection to actual cases of dengue fever ¹. Those working in the field also noted that the community was not responsible enough in regards to managing domestic *Aedes aegypti*

larval breeding areas since they generally left larval control work at their homes to municipal agents.

For all those reasons, in mid-2003 the Government of New Caledonia recommended that deltamethrine no longer be used for prevention and be reserved solely for cases of dengue fever and that community health education be improved ².

In the Southern Province of New Caledonia, each year provincial agents are made available to the townships on a temporary basis (9 months) to combat dengue fever since the townships are, in fact, responsible for preventing outbreaks. However, at that time, these agents were mainly used to bolster township crews

Table 1: Situation analysis

Problems noted	Solutions proposed for the future	Program
<ul style="list-style-type: none">▪ Limits of “technical” control and the community's lack of an adequate response to <i>Aedes aegypti</i> larval breeding areas	<ul style="list-style-type: none">▪ Put greater emphasis on the community health education part of dengue fever control efforts	<ul style="list-style-type: none">▪ Give a health education mandate to some of the agents hired
<ul style="list-style-type: none">▪ Provincial agents hired up to now from a profile that is poorly adapted to community health education about larvae control since that requires communications and negotiating skills	<ul style="list-style-type: none">▪ Hire some agents using the “technical” profile and others using an “educator” profile that takes into account communication abilities	<ul style="list-style-type: none">▪ Different hiring profile, provided to the townships
<ul style="list-style-type: none">▪ Agents' communication methods had little success in the field with the community▪ Very uneven intervention contents	<ul style="list-style-type: none">▪ Improve agents' communications and education skills▪ Standardise interventions	<ul style="list-style-type: none">▪ Basic training supplemented by special training in communications▪ Work on model intervention▪ Regular assessment of the technique
<ul style="list-style-type: none">▪ After training, agents gradually became less motivated about providing health information to the community, further strengthening the tendency to just use technical control measures	<ul style="list-style-type: none">▪ Follow-up, analysis of obstacles, agent support and assessment	<ul style="list-style-type: none">▪ Activity and assessment sheets▪ Regular support for the agents

during insecticide spraying efforts and work to destroy larval breeding areas, with community information relegated to the background and no real education efforts made.

An experiment on providing information to the community door-to-door was carried out and then evaluated in the Southern Province during the summer of 2003-2004. The goal was for agents to stop carrying out larval control themselves but rather to get the population to do it. In order to test the method, only some of the temporary agents hired were chosen for health education and the others kept the normal profile. The program described here involved provincial educator agents.

A period of a few weeks was purposefully left between the two interventions in order to find out if prevention activities continued over time after the first intervention. A home intervention sheet was supposed to be filled out after every visit to make it possible to assess the agents' activities and the impact the first intervention had on results one month later (Table 3).

Since the agents worked in teams, it was not possible to identify the person who actually filled out the sheets or know if the same person did both the first and second interventions. This may introduce a bias into interpretation of the reported results.

Table 2: Training objectives and contents

Basic training (3 days)	Communication training (2 days)
"Technical" and "educator" agents	"Educator" agents
Knowledge	Skills
<ul style="list-style-type: none"> ▪ Dengue fever ▪ Mosquitoes and larval breeding areas ▪ Control techniques by municipal agents ▪ Prevention messages 	<ul style="list-style-type: none"> ▪ Get the community to find and destroy larval breeding areas themselves ▪ Communication techniques ▪ How the work should be done

Materials and method

The first action was to analyse problems reported by field agents in order to design a program that would transform weaknesses into strengths (Table 1).

All the agents hired took part in the three-day basic training session; "educator" agents had an additional two-day training session in communications (Table 2).

At each dwelling involved, the educator agents were asked to:

- carry out an initial intervention educate the inhabitants,
- make a control visit about one month later to the same dwelling: see if there are any potential breeding areas and discuss problems encountered by the population.

Data entry of these sheets was done without recording any personal details and the data were then analysed using EpiInfo software, version 6.04d.

Assessment consisted of analysing the % recorded for the various criteria by first studying the results of the initial and control visits separately.

Then, for double interventions, the impact of the initial visit on the results recorded during the control visit was studied by comparing the percentages recorded for certain criteria of interest. The interventions used were all the double (initial and control) visits possible (inhabitants present) that had initial-control intervals of ≥ 21 days (optimum time period for collecting the maximum number of sheets).

Table 3: Home intervention sheet contents

Date of the intervention
Identity and address
Preventive intervention or one connected to a case of dengue fever
Initial or control intervention
Tick + (yes) or – (no) :
<ul style="list-style-type: none"> ○ The inhabitant was present ○ The inhabitant allowed the educator agent to come in ○ The inhabitant visited the property with the agent (test of inhabitant's motivation) ○ Existence of potential larval breeding areas ○ Existence of larvae ○ Agent showed the inhabitant the correct destruction method for each type of breeding area ○ Information provided by the agent ○ Educational documents given to the inhabitant

The paired control method was used for this comparison: for each criterion studied; initial/control pairs were formed, with four possible results (+/+, +/-, -/+, -/-), "+" for "yes" and "-" for "no".

Three category variables were recorded:

- agents' welcome : the inhabitant allowed the agent to come in (+ / -)
- inhabitant's motivation: he or she visited the property with the agent (+ / -)
- prevention behaviour: existence of potential breeding areas (GP) (+ / -)

It was possible to compare the before/after % observed using the MacNemar test (MN), corrected where necessary, with a significance level set at 5% (Chi2 MN = 3.84). The percentages were declared to be significantly different, with an improvement of the % observed – and so a real impact – when CXhi2 MN was > 3.84.

For reasons of ethics and in order not to falsify the results of the assessment, the agents were informed beforehand that they would not be evaluated on the

results of the population's behaviour during the control visits but rather on the quality of their work techniques.

In order to verify that the educational and communications methods taught during the training sessions were actually applied by the agents, each of them was observed in the field by the supervising team during their interventions. This monitoring was systematically carried out three times for each agent, 15 days, 45 days and 3 months after the communications training session. An individual educational assistance sheet, used for evaluation and for identifying strong and weak points, was completed by the supervisor at the end of the intervention (Table 4). Each item was graded from 0 to 3, and the total of these points corresponded to the overall mark.

The results were analysed by hand in the form of the percentage of agents by skill category.

In addition to this monitoring, a monthly meeting with the agents was held on site in each township; these meetings were designed to analyse, as a group, the problems encountered, review health education techniques and maintain cohesion within the group.

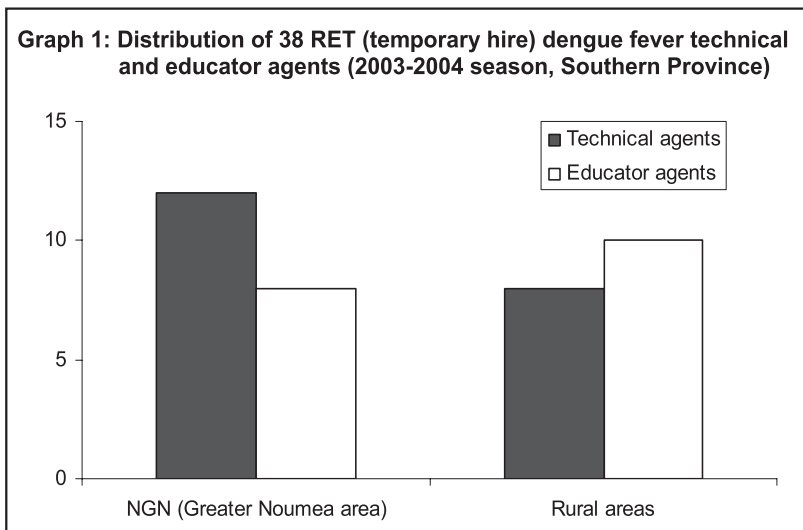
Table 4: Individual educational assistance sheet

<i>Dates of the visits</i>
<i>Contact</i>
Attracted attention (e.g. "Yoo-hoo...")
Hello with a smile
Introduction - "My name is ..."
- "I am a dengue fever control agent"
<i>Lead-in</i>
Explain the goal (e.g. "We need your collaboration in controlling larval breeding areas")
Authorisation (e.g. : "May I come in " or "Can you give me a few minutes of your time")
<i>Approach</i>
Explain what a larval breeding area is
Explain why they have to be destroyed
Propose that you walk around the property together
Point out breeding areas
Show how to destroy them (do this and have the inhabitant do it)
Speak clearly and precisely
Respond correctly to objections (use the explications planned)
Make sure that the person agrees and understands
<i>When leaving</i>
Say that you will come back in one month
Say again that you are counting on the person's collaboration
Say thank you
Good-bye with a smile
<i>Communication</i>
Properly dressed
Proper voice and pronunciation
Active listening
Use simple terms adapted to the person (make the message understandable)
Control your emotions (stage fright, impulsiveness, anger)
No off-putting gestures (arms, evasive looks, scratching your head, wringing your hand, head down etc.)
Show motivation
TOTAL (out 75): 0 to 12 = poor / 13 to 37 = unsatisfactory / 38 to 62 = satisfactory / 63 to 75 = good

Results

Number of agents assigned to the project

Some 38 temporary agents were assigned to dengue fever control, including 17 as educators. The distribution of the technical and educator agents hired varied depending on the township; those townships with high population densities (the four townships in the greater Noumea area: NGN) chose to favour hiring of agents with technical profiles during this outbreak period (Graph 1).



Two additional agents with other profiles strengthened the units in rural areas during a shorter period of time. The rest of this analysis will only cover the educator agents.

The mean size of the population covered by one educator agent differed greatly between urban (NGN) and rural zones (Table 5). The estimated mean number of dwellings per educator agent should have been more precise but that information was not available

Communications training

The agents unanimously confirmed that the training session had helped improve the quality of their work, pointing out that the contents were simple to understand, that they had been able to use the tools in the field

without any problems, that the method had been useful for establishing contact with people, defusing potential aggressiveness, “getting things done” and not doing them in place of the community and that they had sometimes also used it in their personal lives.

Number of interventions conducted

5775 interventions were carried out, including:

- 51.4 % in the urban zone,
- 88.7 % as a preventive measure (i.e. outside a case of dengue fever),
- 57.7 % were initial interventions (i.e. 3335 dwellings),
- An average of only 2.1 % of the population were not at home during the initial intervention, 73.2 % of the dwellings visited benefited from double interventions (initial + control),
- On average, 289 interventions were conducted per educator agent.

Analysis of the quality of the interventions

a) Teaching method used by the agents

Overall agents usually had satisfactory to good results. The agents' previous experience in this kind of work often made the difference.

b) Intervention results

• Separate analysis of initial and control interventions:

o How the interventions went:

The community's acceptance of the agents was good, reflecting the quality of the “lead-in” the agents used during the encounters. The inhabitants often visited their yards with the agents, which was one of the goals.

Nearly three-quarters of the initial interventions were completed (defined as: information given + visited the yard with the inhabitant + showed how to destroy breeding areas).

Table 5: Population coverage by educator agents

Mean population per educator agent (estimated at 01/01/2003)						
Zone	Townships	Population (estimated as at 01/01/2003)	Educator agents	Mean population per agent and township	Max population per agent in one township	Min population per agent in one township
Urban zone	Nouméa, Mont Dore, Dumbéa, Païta	131 956	8	16494	44210	2969
Rural zone	Other townships	17 373	10	1737	2998	578
Total		149 329	18	8297	44210	578

Table 6: Analysis of the quality of the interventions of the agents evaluated 3 times (results from the individual assessment sheets)

Time after the communications training session		D 15	D 45	M 3
Number of agents evaluated		15	15	15
% results	poor	0.0	0.0	0.0
	unsatisfactory	6.6	0.0	0.0
	satisfactory	73.3	66.6	73.3
	good	20.0	33.3	26.6
	satisfactory or good	93.3	100.0	100.0

For incomplete interventions, involving the inhabitant in visiting the property and showing how to destroy breeding areas were the points to be improved.

During the control visits, particular attention was paid to the inhabitant's welcome and the existence of potential breeding areas since this intervention was focussed on assessing the result rather than repeating the initial educational intervention; that's why only the results on the inhabitant's welcome were recorded in this area.

Only the double visits are analysed here. The number of pairs varied depending on the number of questionnaires filled out completely.

A very favourable welcome on the part of the population was noted during both the initial and control visits. "Motivation" was already good initially and improved during the control visits. The existence of larval breeding areas decreased in practically all the townships during the control visits. For the reason already mentioned above, the existence of larvae was not studied here.

Table 7: Results: how the interventions went (analysis of the individual assessment sheets)

Criteria	Initial intervention (%)	Control (%)
	n=3263	n=2363
Inhabitants allowed agents to come in	96,4	98,4
Inhabitant visited property with agents	88,0	
Completed interventions (info + yard visit + demonstration)	71,1	
Among the incomplete interventions:	95,6	
information given	60,5	
yard visited	33,8	
demonstration done (global)	57,9	
demonstration done when breeding area was found		

o Breeding areas and larvae:

A significant percentage of homes with potential breeding areas was noted, realising that not all the houses in the townships were necessarily visited. The existence of larvae is a less interesting criterion since it depended greatly on whether or not there was water in the potential breeding areas.

• Paired analysis of initial and control visits:

o impact of initial education on welcome, motivation and behaviour towards potential larval breeding areas (GP) noted during the control visit:

Discussion

Strong points

- > The stages were carried out as planned and proved to be vital to the program's success:
 - The hiring profile was helpful for the townships and corresponded to the needs;
 - The communications training was greatly appreciated by the agents and the method was used in the field ;
 - Most of the agents were able to use the methods taught, particularly if the initial hiring profile (communications skills) was adhered to ;

Table 8: Results: existence of breeding areas and larvae

Criteria	Initial intervention (%)	Control (%)
	n=3263	n=2363
Existence of potential breeding areas	38.0	21.1
Existence of larvae	14.9	5.3

Table 9: Results: impact of education on 3 criteria

Criteria	Number of pairs	Initial (%)	Control (%)	Chi2	p
Welcome	2 245	95.5	98.3	48.8	$< 10^{-3}$
Inhabitant's motivation	1 967	89.9	93.2	22.1	$< 10^{-3}$
Potential larval breeding areas	2 122	37.5	20.8	216.9	$< 10^{-3}$

- Regular support for the agents avoided a loss in motivation.
- > Analysis of the 5775 interventions carried out in the Southern Province showed:
 - Activity mainly done in prevention situations, rather than linked to cases of dengue fever.
 - Good results for the method in terms of inhabitants' welcome.
 - Three-quarters of the interventions were followed up by a second one, which made it possible to assess the first visits' impact on behaviour (three weeks later, on average) :
 - The inhabitants' welcome and motivation remained steady or it improved,
 - Significant decrease in the existence of potential larval breeding areas at these dwellings.

**We recommend that
this program be
conducted on a yearly
basis with all the
stages.**

Difficulties

- > Team support and leadership proved to be vital for avoiding a loss in motivation among the agents over the length of their contracts but it did require a great deal of logistics;
- > Repeated organisational problems complicated the program:
 - interventions were scheduled during the township's working hours, which sometimes meant people were not at home at those times.
 - the townships had problems transporting agents to their work sites, particularly due to a lack of vehicles.
- > Poor educator agent coverage in those townships with high human densities (greater Noumea area), thereby decreasing the program's effectiveness.
- > Risk of confusion in the community due to the joint actions of "educator" agents (who try to get the population to do larval control) and "technical" agents (who do the larval control themselves).

Conclusion and prospects

The method used in this program showed a certain degree of effectiveness and constitutes an approach to bolster more group-oriented actions (information campaigns, for example). The hoped-for prevention attitude by inhabitants does seem to be maintained after several weeks.

We recommend that this program be conducted on a yearly basis with all the stages. The control visit would be optional after this testing phase although announcing control visits probably is a motivating factor.

Certain improvements would undoubtedly offset the weak points noted. In particular, we recommend that improvements be made to organisation within the townships and that the townships' permanent agents be put in charge of supervising the temporary agents. In urban zones,

which have few educator agents, their efforts should focus on areas with community lifestyles (shantytowns, etc.), zones that have poor entomological indexes (link to entomological surveillance network) and on those inhabitants who do not take the time to eliminate larval breeding areas.

References

1. "Résultats des tests de sensibilité des moustiques aux insecticides effectués par l'Institut Pasteur de Nouvelle Calédonie en 2003" - report dated 18 September 2003 – New Caledonia Pasteur Institute
2. « Dossier de presse Dengue » on the Government's new directives – October 2003 – Environmental Health Unit document - DASS NC.