Bac g d

Recognition of dengue as a major health issue is increasing, especially in Asia and Central and South America [1]. In Nicaragua and Mexico, as in most dengue endemic countries, the national pesticide-dependent approaches have failed to curb the spread of this mosquito-borne disease. Several reviews have shown pace-spraying with pesticide to kill adult mosquitoes to be of little value [2]. Multiple serotypes of dengue virus continue to move northward through Latin America.

Failure to curb the dengue epidemic has led to resurgence of interest in community mobilisation for its vector control. A 2007 systematic review of community-based dengue control programmes, including two randomised controlled trials, found only weak evidence "that community-based dengue control programmes alone and in combination with other control activities can enhance the effectiveness of dengue control programmes" [3]. However, none of these earlier studies used clustered designs.

Several cluster trials have since shown an impact on vector densities. A team in Cuba published a trial of community mobilisation in 16 clusters compared with 16 controls, using vector breeding indices as the outcome [4]. In India, community-level provision of water container covers, clean-up campaigns, and dissemination of dengue information through schoolchildren also reduced vector density [5]. In Thailand, community volunteers reduced vector density [6]. No impact could be detected in a comparison of two communities in the Philippines [7].

A 2011 systematic review of 22 studies involving education messages for community-based dengue prevention concluded that these were effective in reducing entomological indices, but none measured dengue occurrence [8]. A recent systematic review of 14 studies of *B* found ample evidence that this reduced the number of *A* breeding forms but only one study provided any evidence of impact on dengue risk; the study reported one dengue case in the intervention area and 15 cases in the control area [9].

The literature suggests that non-pesticide measures prevent dengue, but there is very little direct evidence of this. A pesticide-free alternative has potential health, economic and environmental benefits.

2004–2008

E g b e a ţ c a ţ

In Managua, Nicaragua, 10 intervention and 20 control sites (132 houses per site, 3,960 households and 3,300 children aged 3–9 years) piloted development of instruments and protocols for a pesticide-free intervention and 39.5% in control sites reported having looked for larvae in their water stores over the last week.

Intraclass correlation coefficient (ICC)

Using an ANOVA framework for the 20 control commucustomising of the intervention, all sites will follow the same protocol to generate community-wide activities that vary widely in character and scope but all built around information about the life cycle of the mosquito and how to interrupt it:

1. Feedback of evidence from the baseline survey to community representatives in discussion groups to author the locally-defined interventions;
2.

to suit the different conditions in the two countries. In Nicaragua, the four-year feasibility study has already provided a good idea of the change process so their emphasis may be more on the quantitative data. Both Mexican and Nicaraguan peer process evaluations will inspected; and e) pupae per person (pu/per) number of pupae collected over the total number of inhabitants of the households inspected.

Secondary outcomes focus on the social capital gained from community engagement and the partial outcomes toward acceptance of the Camino Verde, including knowledge of and attitude to prevention, intention to change prevention behaviour, agency (collective and self-efficacy), discussion/socialisation, and prevention-related action. Additional secondary outcomes include purchase and use of pesticide, and reduced expenditure on health care as a consequence of dengue virus infection.

Data e t a d ec t

The household responses to the questionnaires will be entered twice by independent operators who are ignorant of intervention status of the sites, with verification of discordant entries from the original questionnaires. A data manager ignorant of intervention status of the sites will check digitised data for logical errors. Questionnaires from intervention and control sites will be handled in exactly the same way, with all data technicians unaware of the intervention status of clusters. Site identities will be masked before analysis.

P c a a a

With 150 clusters allocated evenly between intervention and control arms, the cluster analysis of primary outcomes will rest on a t-test, following an intention-to-treat principle (everyone included in each cluster, per allocation). The simultaneous evaluation in control and intervention sites will account for temporal effects. Serological status, reports of dengue illness, and vector indices lend themselves to analysis as continuous

I cat f eat e ce

The case to be made is that informed community mobilisation reduces dengue risks, without reliance on imported pesticide. A secondary case is that the costs compare favourably with the gains of doing this; pesticide-free prevention requires less treatment of cases, less work time lost, and less importation of expensive pesticides.

S ft a e

CIETmap [34] is a hybrid vector-raster GIS software with seamless linkages between epidemiological analysis and mapping. The package provides a windows-like interface with the popular open-source statistical report only grouped findings, in a way that does not allow identification of any individuals or individual

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