Added value of community empowerment in dengue control: Lessons learned from implementation practice in Cuba

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DENGUE

The most important arthropod borne viral disease

No vaccine

No curative treatment

Vector-control strategies failed to counter the expansion
THE CURRENT MAGNITUDE OF THE PROBLEM

- Population at risk: 2.5 - 3.6 billion
- Endemic countries: 100 - 124
- Annual infections: 70-500 million
- Annual dengue fever cases: 36 million
- Annual dengue haemorrhagic fever cases: 2.1 million
- Annual fatal cases: 21,000

WHO and PDVI estimates
THE 20-21st CENTURY PANDEMIC

- Population explosion
- Uncontrolled urbanization
- Rapid global transportation

- Proliferation of the vector
- Spread of the virus
THE MAIN VECTOR

- Peridomestic
- Highly anthropophilic
- Bites during day time
- Breeds in many types of containers in and around the houses

Aedes aegypti
COMMUNITY-BASED DENGUE CONTROL

Challenges:

- There is no agreement on how to define participation nor on how to assess the process

- The few successful pilot projects were small scale:
  - Short follow up time
  - It is unknown whether dengue transmission was reduced
  - Rarely, the community was involved in the process of planning, implementing and evaluating the programme
OBJECTIVE OF THE RESEARCH

GENERAL OBJECTIVE
To provide evidence on the added value of community participation for *Aedes aegypti* control and dengue prevention.

SPECIFIC OBJECTIVES

1. To identify barriers and opportunities for community participation in *Aedes aegypti* control and dengue prevention programmes.

2. To assess the effectiveness, cost and sustainability of community-based strategies inserted in vertical *Aedes aegypti* control programmes.

3. To appraise the transferability of the community-based strategy and the impact on the burden of dengue disease.
STUDY SITES
The study sites were selected because:

- *Aedes aegypti* foci were frequently reported
- Water supply is deficient
- The population stores water in all kinds of containers (many of them are in bad conditions or not covered)
- Sanitary conditions are not adequate in many places
ORGANIZATION OF THE STUDIES BY PHASES

Phase I
Observational study
(To explore the feasibility to implement community based strategies)

Phase II
Observational study
(Fromative Research)

Phase IIIa
Quasi-experimental study
(To assess effectiveness, sustainability and cost)

Phase IIIb
Experimental study
(To assess the transferability of the strategy in a different setting)

Observational study
(To assess the impact on dengue transmission)
PHASE I

To explore the feasibility to implement community-based strategies

- Effects of technical intervention added to the routine programme
  - Substitution of ground level water tanks in bad conditions
  - Intensive use of insecticide (perifocal treatment, indoor and spatial spraying)
<table>
<thead>
<tr>
<th>Dimensions</th>
<th>Pre-trial</th>
<th>Post-trial</th>
<th>Difference</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>$n$</td>
<td>$%$</td>
<td>$n$</td>
<td>$%$</td>
</tr>
<tr>
<td>Susceptibility perceived</td>
<td>180</td>
<td>90.0</td>
<td>193</td>
<td>96.5</td>
</tr>
<tr>
<td>Seriousness perceived</td>
<td>194</td>
<td>97.0</td>
<td>198</td>
<td>99.0</td>
</tr>
<tr>
<td>Barriers perceived</td>
<td>176</td>
<td>88.0</td>
<td>180</td>
<td>90.0</td>
</tr>
<tr>
<td>Self efficacy perceived</td>
<td>38</td>
<td>19.0</td>
<td>42</td>
<td>21.0</td>
</tr>
</tbody>
</table>
At the end of the trial: 17.3% of the new water tanks “lost” and 1% “broken”
IMPACT ON *Aedes* INFESTATION

Infested containers by type (%) and container indices (%) before and up to 9 month after the trial. Guantanamo, study area, April 2001-February 2002.
PHASE II
FORMATIVE RESEARCH

Qualitative & Quantitative methods

Health professionals
Knowledge on community participation

Formal and informal leaders
Perceptions and barriers to community involvement

Population
Determinants of dengue related behavior

• Population transferred the responsibility for *Aedes* control to the health sector

• To attain a significant social mobilisation
  - Unify concepts of community participation
  - Match interest of health providers and community
PHASE IIIa
Effectiveness, sustainability and cost-effectiveness
QUASI-EXPERIMENTAL STUDY

STUDY AREAS
- 3 HEALTH AREAS
  - 20 FAMILY MEDICINE PRACTICES
  - 200 FAMILIES

CONTROL AREAS
- 3 DIFFERENT HEALTH AREAS
  - 20 FAMILY MEDICINE PRACTICES
  - 200 FAMILIES

Routine control programme
+ Community based strategy

2000-2002: Implementation period
2003-2004: Sustainability evaluation
ROUTINE VECTOR CONTROL PROGRAMME:

- Vertically organized

- Main activities are:
  - Entomological surveillance
  - Source reduction through periodic inspection of all houses
  - Larviciding in water storages containers
  - Selective adulticiding
  - Health education

- Routine data on *Aedes* infestation collected by vector control workers (cycle of 22 days)
**MAIN COMPONENTS OF THE COMMUNITY-BASED STRATEGY**

* Creation and training of GROUPS TO ORGANIZE THE COMMUNITY WORK (CWG)

* Development of problem diagnosis by the community
MAIN COMPONENTS OF THE COMMUNITY-BASED STRATEGY

* Monitoring of environmental and behavioural risks at community level
MAIN COMPONENTS OF THE COMMUNITY-BASED STRATEGY

* Development of improved practices by the communities

* Intersectoral coordination
COMMUNITY PARTICIPATION PROCESS
Changes in the process of community participation in the different intervention health areas, Santiago de Cuba 2000-2002

Legend
- : Before intervention (2000)
- : At the end of intervention (2002)

A=Needs assessment, B=Leadership, C=Organisation, D=Resource mobilisation, E=Management
## BEHAVIOURAL INDICATORS AT FAMILY LEVEL

<table>
<thead>
<tr>
<th></th>
<th>Intervention area</th>
<th>Control area</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Before intervention(^a)</td>
<td>End of intervention(^a)</td>
</tr>
<tr>
<td>% Houses with incorrect use of temephos</td>
<td>45.6 (38.5–52.4)</td>
<td>0.9 (0.1–3.6)</td>
</tr>
<tr>
<td>(95%CI)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>% Houses with unprotected artificial containers</td>
<td>61.9 (54.9–68.8)</td>
<td>6.1 (3.1–10.2)</td>
</tr>
<tr>
<td>(95%CI)</td>
<td></td>
<td></td>
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<tr>
<td>% Houses with containers for water storage (low tanks)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Un-covered</td>
<td>49.5 (42.4–56.6)</td>
<td>2.6 (0.8–5.7)</td>
</tr>
<tr>
<td>(95%CI)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Badly covered</td>
<td>20.5 (13.1–26.8)</td>
<td>12.5 (8.3–17.9)</td>
</tr>
<tr>
<td>(95%CI)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Well covered</td>
<td>30.0 (23.7–36.9)</td>
<td>85.0 (79.3–89.6)</td>
</tr>
<tr>
<td>(95%CI)</td>
<td></td>
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IMPACT ON ENTOMOLOGICAL INDICATORS

PHASE IIIb

Evidence of transferability

CLUSTER RANDOMISED TRIAL

Results

After 12 month: *Aedes* infestation was significantly lower in the intervention areas than in the control areas (-50% for larval indices and -73% for pupae indices)
Evidence of health impact
Distribution of the total number of dengue cases per house block in the intervention and control blocks, April 2006-March 2007

<table>
<thead>
<tr>
<th>Number of dengue cases/block</th>
<th>Intervention blocks</th>
<th>Control blocks</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Number</td>
<td>Cumulative %</td>
</tr>
<tr>
<td>0</td>
<td>13</td>
<td>45</td>
</tr>
<tr>
<td>1</td>
<td>8</td>
<td>72</td>
</tr>
<tr>
<td>2–4</td>
<td>7</td>
<td>97</td>
</tr>
<tr>
<td>5+</td>
<td>1</td>
<td>100</td>
</tr>
<tr>
<td>Total</td>
<td>29</td>
<td></td>
</tr>
</tbody>
</table>

- More unaffected intervention blocks
- Control blocks had on average substantially more cases per affected block
Weekly dengue attack rate in the intervention and control blocks, April 2006-March 2007

Duration: 5 vs 16 weeks
Attack rate: 8.5 vs 38.1 x 1000 inhabitants (RR =4.5 95% CI 3.1-6.5)
Preventable fraction: 78%
GENERAL CONCLUSIONS

• Community involvement could add value to technical tools deployment
  - Acceptability & adoption
  - Behavioural change
  - Sustainability of the results

• Formative research is a key element for the design of community-based strategies
  - Context
  - Perception of social actors
  - Risk behaviours
• Community-based strategies inserted in the routine vector control programme
  - Effective
  - Sustainable
  - Transferable

• Community participation in *Aedes aegypti* control may be effective to reduce dengue transmission
LESSONS LEARNED

- Community participation is not a spontaneous process.

- Community-based strategies are complex and context-dependent interventions.

- In the implementation process, the main components of the strategy need to be defined.
• There is not an “standard recipe” for the implementation process, and the outcomes are not uniform

• Institutionalization of community-based strategies is a key element for maintaining long term results
REMAINING QUESTIONS

• Transferability of the strategy to socio-economically different contexts

• Organizational changes needed for successful implementation at large scale

• The interaction between implementation factors and sustainability