

Mariana I González Fernández<sup>I</sup>

Emanuel Orozco Núñez<sup>II</sup>

Enrique Cifuentes<sup>III,IV</sup>

# Policy analysis of the dengue control program in Mexico

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## ABSTRACT

**OBJECTIVE:** To analyze municipal measures implemented to control the dengue epidemic, giving priority to the functions of intersectoral coordination, policy strengthening and community participation.

**METHODS:** The observational study was performed in Morelos, Mexico in 2007. Data collected in interviews and direct observations were submitted to contents analysis and policy mapping. Policy Maker software was used to evaluate the values assigned to the stakeholders' performance (i.e., high, medium and low criteria) and to their role (actions undertaken for surveillance, control or management). A strategic analysis of opportunities and challenges regarding public policies and dengue control was conducted.

**RESULTS:** The legal framework indicates that the approach to the dengue epidemic should be an intersectoral response. However, the burden of activities in terms of financial and human resources tends to fall on local health services, which contrasts with the contribution of other sectors (e.g., water and sanitation) that do not recognize their responsibilities. A high degree of operational feasibility links, in terms of optimization of resources and objectives fulfillment was detected, particularly among health authorities at state, jurisdictional and municipal levels.

**CONCLUSIONS:** A multidisciplinary approach and strengthening of policy stewardship may allow a more efficient response to dengue outbreaks, sustained by intersectoral coordination and the active participation of the affected population.

**DESCRIPTORS:** Dengue, prevention & control. Communicable Disease Control. Mosquito Control. Epidemiologic Surveillance. Consumer Participation. National Policy of Health Surveillance. Health Public Policy.

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## INTRODUCTION

The reemergence of dengue fever (DF) and its serious manifestations (dengue hemorrhagic fever – DHF, dengue shock syndrome – DSS) dramatically reflect the consequences of urbanization, the collapse of public services (water and sanitation), the weakening of vector control programs and, in some form, extreme climatological phenomenon.<sup>3,5-7</sup> Dengue fever is a viral illness transmitted by mosquitoes of the *Aedes* genus and has an elevated prevalence at the global level with epidemiological, social and economic impacts.<sup>4,5,6,8,9,a</sup> The Pan American Health Organization (PAHO) has calculated that 2.5 billion people live in risk areas, 50 million people are infected annually and more than 500 thousand develop the more serious form of illness: DHF.<sup>10,b</sup>

<sup>I</sup> Centro Regional de Control de Vectores. Servicios de Salud de Morelos. Morelos, México

<sup>II</sup> Centro de Investigación en Sistemas de Salud. Dirección de Innovación en Sistemas y Servicios de Salud. Instituto Nacional de Salud Pública (INSP). México DF, México

<sup>III</sup> Environmental Health Department. Harvard School of Public Health. Boston, USA

<sup>IV</sup> Dirección de Salud Ambiental. INSP. México DF, México

### Correspondence:

Enrique Cifuentes  
Environmental Health  
Harvard School of Public Health  
677 Huntington Ave.  
02115 Boston, MA, USA  
E-mail: ecifuent@hsph.harvard.edu

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<sup>a</sup> Bustamante M. La Fiebre Amarilla en México y su origen en América. México: Instituto de Salubridad y Enfermedades Tropicales; 1958. p.1-217.

<sup>b</sup> Pan American Health Organization. Dengue. Resolution CD44.R9 55th session of the regional committee, 44th directing council. Washington; 2003[cited 2006 Dec 12]. Available from: <http://www.paho.org/english/gov/cd/cd44-r9-e.pdf>

To respond to the emergency, the World Health Organization (WHO) and PAHO<sup>10,b</sup> established four principal guidelines for improving health policies and performance of prevention and control measures for dengue fever:

1. Political will of governments
2. Intersectoral coordination
3. Active participation of the community and
4. Strengthening of sanitation laws.

Of these components, the first two fundamentally involve the development of public policies and the implementation of sectoral and intersectoral programs, financial planning, human resources training and organization of intensive risk communication campaigns. The fundamental structure for the prevention and control of DF/DHF falls to the health sector, which has a protagonistic role in the tasks of epidemiological, entomological and environmental surveillance. Capacity building of personnel and coordination with other sectors are indispensable. The execution of these policies requires cooperation between levels of government and compliance with legislation that supports the prevention and control programs. Experience shows that active participation by the community in the sanitation of living spaces has important results, especially in eliminating the breeding places of the mosquito vector. These principals seek to strengthen policy implementation through coordinated attention to the necessities of water and sanitation. This should promote the structuring and coordination of government action, which should adjust to leadership and balance the exercise of power with the common interest.<sup>1,12</sup>

In 2003, the Directing Council of WHO/PAHO approved resolution CD44R9, which promotes changes in the focus of national dengue control programs.<sup>10,b</sup> This resolution highlights the importance of integrated management and of greater responsibility in the planning and implementation of activities: epidemiological surveillance (reporting of suspected and confirmed cases), laboratory diagnostics and timely confirmation, entomological surveillance (active searching for the vector and its habitat), environmental surveillance (e.g., water and sanitation) and risk communication.<sup>c,d,e</sup>

Studies in Mexico do not exist that describe operational barriers from the perspective of agents involved in the surveillance and control programs of illnesses transmitted by the vector. The objective of the present

study was to analyze the dengue control measures implemented at the municipal level, with special attention given to sectoral coordination, management and participation of social groups.

## METHODS

We performed a descriptive study, utilizing policy analysis techniques of government priorities relative to DF and HDF control program in the state of Morelos, Mexico. We selected three municipalities from the location (Cuernavaca, Jojutla and Cuautla) due to their historical experiences with dengue outbreaks and complications, available registries of vector densities and coverage of basic public services (potable water, waste collection and final disposal of wastes).

We utilized rapid appraisal procedures (RAP) and policy analysis procedures.<sup>11-14,f</sup> We reviewed the legislation related to intersectoral coordination and community participation, developed the interview guides and performed direct observation. The interviews were semi-structured and administered to key informants, with an emphasis on the tasks of intersectoral coordination and responses to outbreaks of vector transmitted illnesses. Key informants were defined as those that could influence the conduct of public policy or influence resource allocation and therefore impact the health and environment sectors. We visited the three municipalities and government offices, where direct non-participant observations were performed in order to evaluate compliance or performance of surveillance and control tasks. The study sample consisted of 29 key informants, stratified according to the level of government (state, jurisdictional, municipal and local) and selected because of their operational participation in risk communication, health and environmental sanitation promotion, planning, capacity building and the performance of epidemiological surveillance and control tasks.

The interviews were taped, except for some cases where, at the request of informants, only notes were taken. The information was coded according to the theme of interest and placed in content tables. In accordance with Bossert,<sup>2</sup> we developed a scale of values assigned to the variables analyzed (e.g. use of resources, knowledge of the legal framework, capacity building and performance of surveillance, prevention and control activities), assigning the following criteria: +++ optimum classification; ++ regular, + low or limited value.<sup>11,f</sup> This type of metric has been applied to health reform policies.<sup>11,f</sup>

<sup>c</sup> Secretaría de la Salud. Ley Estatal de Salud del estado de Morelos. *Diario Oficial Federacion*. [cited 14 Jan. 2004].

<sup>d</sup> Secretaría de la Salud. Ley General de Salud. *Diario Oficial Federacion*. [cited 18 Dec. 2007].

<sup>e</sup> Secretaría de la Salud. Norma Oficial Mexicana NOM-032-SSA2-2002. Para la vigilancia epidemiológica, prevención y control de enfermedades transmitidas por vector. *Diario Oficial Federacion*. [cited 21 Jul 2003].

<sup>f</sup> Reich M, Cooper D. Análisis político asistido por computador: Mejorando el arte de la viabilidad. Policy Maker. Versión 2.2. México; 1996.

The analysis of the system's leadership was undertaken based on a review of policies pertaining to the control of dengue (General Health Law, State Health Law, the Official Mexican Norm - 032-SSA2-2002,<sup>c,d,e</sup> the state development plan<sup>g,h</sup> and municipal development plans of Cuernavaca,<sup>i,j</sup> Jojutla<sup>k</sup> and Cuautla<sup>l,m</sup>). The review of the legal framework identified normative provisions that establish different degrees of intersectoral responsibility, from the federal to the municipal domain. However, the application of this framework has clearer operational language in the state health sector than, for example, compared to the municipal health, water and sanitation sectors.

The PolicyMaker software program was used as an auxiliary tool<sup>14,11,n,f</sup> that allows for electronically ordering the information for specific procedures. For example, it can help in the mapping and identification of policy agents, dependencies and programs, definition of objectives of the policy agenda, knowledge of the legal framework, response tasks during vector transmitted illnesses and identification of barriers and opportunities.

Finally, we performed the strategy analysis using the perspectives of informants and their recommendations as a reference point.

This study was reviewed and approved by research ethics committees of the Instituto Nacional de Salud Pública de México (protocol number 7916-A1 SALUD-2002-C01) in September 2007.

## RESULTS

### Policy and its agents

Table 1 shows the degree of involvement and power of the agents, in regards to dengue control and prevention policies.

Once we defined power as depending on the resources allocated to dengue prevention and control activities, we observed that the health services sector provides greater financial and human resources support, in contrast to what other sectors devote to larval control, spraying and sanitation (e.g., clean yard) activities. We found that the reported support was not homogenous between the different municipalities affected by dengue.

We identified an important lack of knowledge about

**Table 1.** Involvement and power of stakeholders in regards to dengue control and prevention policies. Morelos, Mexico, 2007.

Environment	Agent	Involvement	Power
State	Health Services	+++	+++
	CEAMA	+	+
Jurisdictional	Jurisdictions of the Health Services	+++	++
	Reference Hospitals	++	++
	Municipal Health	++	+++
Municipal	Municipal sanitation and waste	++	++
	Councils	+	++
Local	Community	++	++

Scale: +++ High; ++ Medium; + Low

CEAMA – State Commission of Waster and the Environment

the legislation concerning intersectoral coordination. Also, there is evidence that the municipal water and sanitation sectors, municipal councils, and the actual community, mistakenly assume that the health services are the only ones responsible for dengue prevention and control.

The degree of implementation of prevention and control activities are presented in Table 2. Sanitation and cleaning activities showed poor performance at the municipal level, although these activities positively impact the empowerment of the population and eventually strengthen the impact of community interventions to eliminate mosquito breeding areas. The cause of this deficiency in the state and jurisdictional domains is the limited participation of the most affected communities in the activities developed by health services.

Informants from health services reported a satisfactory implementation of functions related to management, planning and execution of actions in the jurisdictional and municipal domains. We found a different situation in other sectors, such as the State Commission of Water and the Environment (CEAMA), the municipal sanitation services and the actual populations of the communities, who demonstrated a low performance of prevention activities.

<sup>g</sup> Gobierno del Estado Libre y Soberano de Morales. Plan estatal de desarrollo 2001-2006. *Tierra Libert.* 2001;4144:1-62.

<sup>h</sup> Gobierno del Estado Libre y Soberano de Morales. Plan estatal de desarrollo 2007-2012. *Tierra Libert.* 2007;4521:1-156.

<sup>i</sup> Gobierno del Estado Libre y Soberano de Morales. Gobierno del Estado Poder Legislativo. *Tierra Libert.* 2005;4431:1-61.

<sup>j</sup> Gobierno del Estado Libre y Soberano de Morales. Gobierno del Estado Poder Legislativo. *Tierra Libert.* 2007;4546:1-80.

<sup>k</sup> Gobierno del Estado Libre y Soberano de Morales. Gobierno del Estado Poder Legislativo. *Tierra Libert.* 2008;4617:1-80.

<sup>l</sup> Gobierno del Estado Libre y Soberano de Morales. Gobierno Federal Secretaría de Gobernación Unidad de Gobierno. *Tierra Libert.* 2004;4343:1-65.

<sup>m</sup> Gobierno del Estado Libre y Soberano de Morales. Gobierno del Estado Poder Legislativo. *Tierra Libert.* 2007;4544:1-64.

**Table 2.** Stakeholders' perspectives about the degree of compliance with dengue control and prevention functions. Morelos, Mexico, 2007.

Function	Domain / Type of agent								
	State		Jurisdictional			Municipal		Local	
	Health Services	CEAMA	Jurisdictions of the Health Services	Reference Hospitals	Municipal Health	Municipal Sanitation and Waste	Councils	Community	
Effective leadership	+++	+	++	++	++	+	+	+	
Political will of the governments	+++	+	+++	++	++	+	+	+	
Intersectoral coordination	++	+	++	++	++	++	++	+	
Community participation	+++	+	+++	+	++	+	+	++	

Scale: +++ High; ++ Medium; + Low

CEAMA - State Commission of Waster and the Environment

**Table 3.** Level of practicability of opportunities for action to control and prevent dengue, according to domain. Morelos, Mexico, 2007.

Opportunities for action	Ámbito / Tipo de actor							
	Cumplimiento							
	State		Jurisdictional			Municipal		Local
Health Services	CEAMA	Jurisdictions of the Health Services	Reference Hospitals	Municipal Health	Municipal sanitation and waste	Councils	Community	
Linkages to optimize resources and meet goals	+++	++	+++	++	+++	++	++	++
Immediate case notification	+++	NA	+++	+++	++	NA	++	++
Establishment of accords and design of strategies	+++	++	+++	+	+++	++	+++	+
Efficiency in the waste collection and disposal processes and elimination of breeding areas	+++	+++	+++	+	+++	+++	+++	+++
Establishing dengue as a government priority	+++	++	+++	+	+++	++	++	+
Adequate capacity	+++	+	+++	+++	+++	+	+	++

Scale: +++ = High; ++ = Medium; + = Low; NA = Not Applicable

### Areas of opportunity

Table 3 shows the opportunities for strengthening public policy and dengue control programs, considering the low participation of sectors outside of the health services. When considering the involvement in policy-making, our results suggest a high degree of operational feasibility for the health sector, as well as the state, jurisdictional and municipal levels. We found a medium level of opportunity in regards to intersectoral cooperation, due to unfamiliarity or non-compliance with legal responsibilities on the part of the other sectors. In regards to the registry system for probable and confirmed dengue cases, we assigned a medium degree of feasibility for improvement among health personnel, municipal councils and the community,

due to their limited participation in epidemiological surveillance activities.

### The challenges

Table 4 presents the principle challenges identified through the analysis of current regulations, government priorities, state and municipal development plants, the leadership of agents, the definition of roles and tasks related to the control and prevention of dengue.

The changing and transfer of trained staff stands out among the main challenges because it complicates the following of intersectoral accords and implementation agreements. We observed a similar occurrence among the municipal and state authorities. These challenges

**Table 4.** Practicability of frameworks for dengue control and prevention. Morelos, Mexico, 2007.

Frameworks	Domain / Type of agent							
	State		Jurisdictional		Municipal		Local	
	Health Services	CEAMA	Jurisdictions of Health Services	Reference Hospitals	Municipal Health	Municipal sanitation and waste	Councils	Community
Compliance with intersectoral agreements	+	+	+	+	+	+	+	+
Compliance of legal responsibilities on the part of agents	++	+	++	++	+	+	+	++
Division of health functions and responsibilities	++	+	++	++	++	+	++	+
Linkages between sectors	+++	++	++	++	++	++	++	++
Efficiency in public dispersal of information	+++	NA	+++	++	++	NA	NA	NA

Scale: +++ = High; ++ = Medium; + = Low; NA = Not Applicable  
CEAMA - State Commission of Waster and the Environment

were corroborated through field visits and the verification of epidemiologic information, specifically the period of greatest decline in dengue control and prevention activities, on the one hand, and increase in cases and outbreaks, on the other.<sup>9</sup>

The lack of clarity in tasks around the provisioning of water and environmental sanitation, which legally should be assumed by CEAMA and the local population, constantly appeared as significant challenges. We identified several operational contradictions and duplications in the content of the Federal and State Health Laws, which have a low degree of practicability for the compliance of functions and responsibilities of CEAMA and the community.

The most practical challenges to overcome within the health sector concern the dispersal of information, communication channels for messages pertinent to the population and access to existing technological tools. The involvement and leadership of agents from the health services appears to improve linkages and coordination between other agents of the health sector. This was reflected in the medium level of practicability for linkages and coordination among these agents.

## DISCUSSION

The analysis of dengue control policies demonstrates the poor management of intersectoral tasks, with an excess burden of activities for the health sector and unfavorable implications in terms of financial resources and human

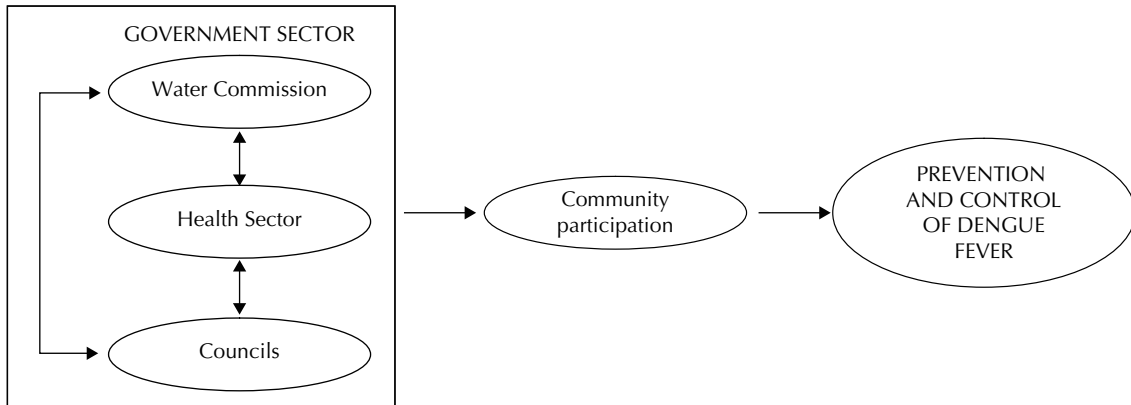
resources. According to this analysis, institutional failings involve other public services (water supply and sanitation at the municipal level) and include a list of operational non-compliance in the tasks of vector control and notification of suspected and confirmed dengue cases. These omissions and failings explain somehow the relative absence of the local population in activities to eliminate breeding areas of the mosquito vector. The combined institutional and social failings have resulted in the epidemiologic situation of dengue in the state of Morelos during the last ten years.

Compliance with the different levels of responsibility would allow for greater transparency and improved performance by the respective spheres of competency and levels of government. Even when the existing legislation clearly indicates that vector control is a municipal responsibility, mechanisms do not yet exist to guarantee intersectoral compliance with the regulatory framework in terms of financial and operational participation.<sup>2,12</sup> As far as we know, the observations described in this study represent an original finding in the policy analysis of our country's dengue control program.

Although municipal health personnel had medium influence upon dengue control and prevention activities, the implementation of these tasks was performed by the health sector at the jurisdictional level, even when it does not have real autonomy to make the respective decisions.

On the other hand, concerning the identification of opportunities, the existence of formal regulatory

<sup>9</sup> Sistema Nacional de Vigilancia Epidemiológica. Registro Estatal de Fiebre por Dengue: Servicios de Salud del Estado de Morelos. Cuernavaca; 2007.



**Figure.** Coordination of the dengue control response. Morelos, Mexico, 2007.

frameworks could reinforce intersectoral coordination in the epidemic control program, especially in terms of accountability, achieving results and improving the effectiveness of health protection activities.

The focus of this study has documented an excess burden of dengue control activities upon the health sector. A similar situation has been reported in Cuba and other countries affected by the epidemic.<sup>15</sup> Therefore, we emphasize the urgency of supporting a comprehensive strategy that links public policies with the supply of health services and promotes social participation, with available resources directed to more at-risk populations.<sup>15-17</sup>

According to this perspective and based on principles proposed by the WHO/PAHO and the National Health Program,<sup>9</sup> the recommendations proposed in Figure 1 would help: a) noticeably reduce the density of *Aedes* mosquitoes and risk factors for dengue transmission; b) reinforce the epidemiological surveillance system, improving laboratory, diagnostic and treatment capacity for cases; and c) optimize communication processes, within and between sectors, for the timely exchange of information. Also, mechanisms for effective leadership and accountability should provide transparency and sustainability to the prevention and control of dengue epidemics in these communities.

The most salient opportunities for linkages between agents, who could strengthen the dengue prevention and control program, are presented in the Figure, such as:

- Intersectoral linkages between agents of the state, jurisdictional and municipal health sectors, especially: CEAMA, municipal sanitation, municipal councils and the community.
- Strengthening of the case detection, diagnosis and notification system on the part of all agents,

including the community.

- Involve all agents in the collection and final disposal of solid waste, promoting the elimination of the most productive mosquito breeding locations.
- Capacity of sector personnel such as: CEAMA, sanitation and waste and municipal councils, thereby strengthening the capacity of health personnel to standardize the information they provide to the population.
- Provide continuity to collaboration agreements between institutions (i.e. health and municipal services).
- Publish regulations to provide continuity to the State Health Law, thereby guaranteeing compliance with (financial and human resource) functions and responsibilities by the agents: state (CEAMA), municipal (Municipal Health, sanitation and waste and municipal councils) and local (population of the community).
- Implement vector control actions, involving the community through the participation of the school population.
- Adapt education activities provided by the health promotion programs to dengue materials, involving and establishing intersectoral linkages with the Education Sector and CEAMA.
- Strengthen epidemiological, entomological and laboratory communication, at the state jurisdictional, municipal and local level.
- Encourage transdisciplinarity and establishing integrated strategies by creating multidisciplinary work groups (entomologists, decision-makers, epidemiological community leaders, ecologists and anthropologists).

<sup>9</sup> Secretaría de Salud. Programa Nacional de Salud 2007-2012 por un México sano: construyendo alianzas para una mejor salud. Cuernavaca; 2007.

- Meet infrastructure needs for the provision of potable water and waste disposal at the municipal level.
- Strengthen priorities in the government agenda at the level of municipal authorities (particularly in communities more susceptible to dengue).

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