



*Vector Biology  
and Control Project*

***Aedes/Dengue Control In Guayaquil  
and Other Urban Areas of the  
Pacific Coast of Ecuador  
September - October 1990***

**by**

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## 1.A. Executive Summary

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The Vector Biology and Control Project furnished two consultants from September 15 to October 4, 1990, to review the SNEM *Aedes aegypti* program. The program was evaluated, and some changes in administration and technical strategy proposed. An overview of the current status of *Ae. aegypti* control was obtained from a review of SNEM documents and consultant reports, discussions with SNEM staff and the subsecretary of health and visits to control operations in the north and south sectors of Guayaquil, Santa Elena and Manabi.

A dengue serotype 1 epidemic began in 1988 with an estimated 800,000 cases. Virus activity subsequently spread to other coastal cities, and dengue cases continue to be reported. There is widespread concern that other dengue serotypes might be introduced and that cases of dengue hemorrhagic fever (DHF) could occur. Conditions for dengue transmission still are found in major populated areas of Guayaquil despite large-scale efforts to reduce *Aedes aegypti* indices.

Anti-*Aedes aegypti* activities have been transferred to private companies because of labor and other managerial problems. Two companies with a total staff of about 300 are involved in larval control, source reduction and health education activities in Guayaquil. SNEM Supervises and evaluates this work. For a number of reasons, this arrangement is not working effectively. *Aedes aegypti* surveillance and control in other coastal cities are under direct administration of the SNEM zone offices. In Zone VI this system is effective, but problems exist in areas of coastal Guayas and in Zone VII.

To be cost effective and to protect against another dengue epidemic, the present *Aedes aegypti* program must undergo major administrative and technical changes. The lack of coordination among the various individuals within SNEM and elsewhere concerned with *Aedes*/dengue hinders all aspects of surveillance and control. A major part of this problem could be solved by placing all

senior staff in a central office under SNEM. The staff will need its own transportation and other resources to improve the quality of work. Staff members will need some day-to-day control of finances and direct responsibility for planning, administration and implementation of the program along with the authority to manage it.

Coordination of other Ministry of Health groups involved in virus surveillance, diagnosis and treatment of dengue/dengue hemorrhagic fever requires revitalization. A national committee on dengue is urgently needed. The committee should maintain epidemiological data on dengue activity and vector surveillance in Ecuador in major urban areas along the coast, develop an emergency contingency plan and serve as an information center on dengue for health personnel, *Aedes* control staff and the public.

Existing *Aedes aegypti* surveillance and control strategies are not realistic for Ecuador. This operation is expensive and will become more so as USAID assistance to SNEM is withdrawn. The *Aedes* program must stratify all its activities to emphasize identifying high-risk areas and to target *Aedes aegypti* surveillance and limited control. There is evidence of control breakdown in Guayaquil, which might be associated with changes in the vector's susceptibility to the organophosphorus insecticides. This situation requires immediate study. The government should limit the use of insecticides during low dengue transmission periods to delay the possibility of the vector becoming resistant to these chemicals. ULV treatments should be made only when and where virus activity warrants and should be carefully evaluated. During periods of limited virus transmission, control activities should be directed toward improving community participation, especially to reduce mosquito breeding in potable water tanks and general source reduction of other breeding sites demonstrated to be important.

It is virtually certain that another dengue serotype will arrive in Ecuador in the near future. Epidemic transmission of the new serotype is likely in at least some areas where the last epidemic took place; some, if not many, cases of DHF or dengue shock syndrome (DSS) will occur. The history of yellow fever epidemics and the past dengue epidemic indicates that increased surveillance is important immediately before and during the rainy season.

Because early hospitalization and proper management of shock can save the lives of a substantial portion of DHF/DSS cases, a major objective of the *Aedes aegypti* control program should be to at least spread out the occurrence of cases over time so that cases can be managed with available resources. A more ambitious goal would be to suppress the *Aedes aegypti* populations in Ecuador enough that no outbreaks occur. Present resources, however, are inadequate to achieve this goal. Although eradication of *Aedes aegypti* would be desirable, it is unrealistic because of cost and almost certain re-introduction from adjacent countries. Therefore, it should not be considered a program objective.

## 1.B. Resumen Ejecutivo

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El proyecto de Control y Biología del vector proporcionó dos consultores desde Septiembre 17 hasta Octubre 4, 1990, con el propósito de evaluar el Programa de Control del *Aedes aegypti* del Servicio Nacional de Erradicación de la Malaria (SNEM). El Programa fué evaluado y se proponen algunos cambios en la administración y en la estrategia de la técnica. Una visión general del estado actual del control del *Aedes aegypti* fue obtenida mediante una revisión de los documentos del SNEM y de los reportes de consultores, de discusiones con el personal del SNEM y el Subsecretario de Salud, así como de visitas al terreno para observar las operaciones en los sectores norte y sur de Guayaquil, Cantón Santa Elena y Manabí.

La epidemia de dengue serotipo Den-1 comenzó en 1988 con un estimado de 800,000 casos. Subsecuentemente, la acción del virus se propagó hacia otras ciudades costeras y continúan reportándose casos de Dengue-1. Existe una preocupación generalizada de que otros serotipos de dengue puedan introducirse y con ello puedan presentarse casos de dengue hemorrágico.

Aún existen condiciones favorables para la transmisión del dengue en las áreas más populosas de Guayaquil a pesar de los esfuerzos a gran escala que se han hecho para reducir los índices de *Aedes aegypti*.

Problemas laborales y de administración fueron la consecuencia de la transferencia de las actividades anti-*Aedes aegypti* a compañías privadas. Dos compañías con un personal total de cerca de trecientos (300) empleados están involucrados en el control larvario, actividades de reducción de las fuentes y de educación para la salud relacionadas con el *Aedes aegypti* en Guayaquil. La supervisión y evaluación de este trabajo es realizado por el SNEM. Por un sin número de razones, este aspecto no está funcionando eficientemente. La vigilancia y el control del *Aedes aegypti* en otras ciudades costeras, está bajo la directa administración de las oficinas zonales del SNEM. En la Zona VI-Manabí, este sistema es

eficiente. Existen problemas en las áreas costeras del Guayas y en la Zona VII, Esmeraldas.

Para que el actual programa de *Aedes aegypti* sea financieramente rentable y provea una buena protección contra otras epidemias de dengue, este deberá sustentarse sobre bases sólidas de cambios administrativos y técnicos sustanciales. La falta de coordinación de algunas personas dentro del SNEM y de otras instituciones que tienen relación con el Aedes/Dengue, obstaculizan todos los aspectos de la vigilancia y el control. La mayor parte de este problema podría ser resuelto instalado a todo el personal con nivel de decisión en una oficina central y bajo el control del SNEM (Ver organigrama del SNEM de 1989). El personal necesitará transporte y otros recursos para mejorar la calidad del trabajo. Se requerirá que se realicen controles bajo un proceso computarizado de los fondos y que se tenga auditoria trimestral, así responsabilidad directa en la planificación, administración e implementación del programa y la autoridad necesaria para administrarlo.

La coordinación con otros grupos del Ministerio de Salud involucrados con el control del virus, diagnóstico y tratamiento del dengue/fiebre del dengue hemorrágico requiere de una revitalización. Existe una necesidad urgente de reorganizar el Comité Nacional del Dengue encargado de mantener la información epidemiológica sobre las actividades del dengue y sobre el control del vector en Ecuador en las grandes áreas urbanas a lo largo de la costa-desarrollando un plan de emergencia y sirviendo como un centro de información para el personal de salud, para el personal de control del *Aedes aegypti* y para el público en general.

Las actividades de vigilancia y control del *Aedes aegypti* no son realistas para el Ecuador. El costo de operación es alto y se hará más costoso para el gobierno cuando USAID suprima su ayuda al SNEM. Todas las actividades del Programa *Aedes aegypti* deberán ser estratificadas para poner más énfasis en la identificación de áreas de alto riesgo y en la vigilancia del *Aedes aegypti* y en el control limitado dentro de ellas. Esta es una evidencia de la estrategia de control en Guayaquil, la cual podría estar asociada con los cambios en los niveles de susceptibilidad a los insecticidas organofosforados, los que requieren ser estudiados

inmediatamente. El gobierno deberá limitar el uso de insecticidas durante los periodos bajos de transmisión del dengue para retrasar una posible resistencia del vector a estos químicos. Los tratamientos ULV deberán hacerse solamente cuando y donde la actividad del virus la garanticen. Durante los periodos de transmisión limitada del virus, las actividades de control deberán ser dirigidas hacia el logro de la participación de la comunidad, especialmente para reducir la cría del mosquito en tanques de agua potable, y la reducción general de otros lugares de cría que han demostrado ser importantes.

Es virtualmente seguro que otro serotipo de dengue arribará a Ecuador probablemente en un futuro cercano. Es probable que la transmisión epidémica del nuevo serotipo ocurrirá en los mismos lugares en donde la anterior epidemia se llevó a cabo y el DHF/DSS se presentará en las mismas áreas. La historia de las epidemias de fiebre amarilla y la anterior epidemia de dengue indican que la temporada lluviosa es un factor preponderante para una vigilancia incrementada.

Ya que una temprana hospitalización y un manejo apropiado del shock pueden salvar las vidas de un porcentaje sustancial de casos de DHF/DSS, el objetivo principal del Programa de Control del *Aedes aegypti* deberá ser al menos dar a conocer la existencia de estos casos de tal manera que los casos que se presente puedan ser manejados con los recursos disponibles. Una meta más ambiciosa podría ser suprimir las poblaciones de *Aedes aegypti* en el Ecuador de tal manera que no se presenten brotes epidémicos. Sin embargo, los recursos actuales son inadecuados para alcanzar esta meta. A pesar de que la erradicación del *Aedes aegypti* sería lo ideal, esto es algo irreal, debido al costo y la casi re-introducción en los países vecinos. Por lo tanto, esto no debe ser considerado como un objetivo del Programa.

## 2. Introduction

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The purpose of this consultancy was to help the Ministry of Public Health reduce the risk of dengue in Guayaquil and other urban areas of coastal Ecuador by improving *Aedes aegypti* control. As a result of a series of meetings with staff of USAID/Quito and the Ministry of Public Health, the scope of work was modified to place more emphasis on improving technical and managerial aspects of the control program and to provide guidance for control activities once A.I.D. funding of the malaria and vector-control activities ends.

Because the assignment was shorter than originally planned, national staff was not trained. The report and its annexes, however, provide useful material for staff development and training. Although calibration of ULV equipment was listed as a duty of the team, we did not do it because Dr. Nelson of PAHO, in collaboration with SNEM staff, had found droplet size adequate in a sample of the different ULV machines. Therefore, it was decided to direct our attention elsewhere to other important issues.

The scope of work of this consultancy consisted of the following:

1. Review the organization of control activities including reporting of field results, preparation of weekly work plans, data flow and analysis, interpretation of results and decision-making.
2. Review stratification techniques and suggest changes more applicable to existing and future financial constraints.
3. Review health education materials currently used and recommend additional (or improved) materials and the means to disseminate them.
4. Recommend ways the community can help eliminate *Aedes* breeding sites.

- 5. Develop guidelines for contingency planning for dengue hemorrhagic fever prevention and control.**

**The technical team visited Ecuador from September 15 to October 4, 1990.**

### 3. Background

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A major epidemic of a disease believed to have been yellow fever occurred in Guayaquil in 1740. In 1842, a boat carrying a case of yellow fever docked at Guayaquil. Yellow fever cases were reported within a month, and within six months 10 percent of the population was dead. By the time the epidemic had run its course in 1844, it was estimated that about half the population had died.

Epidemics continued into the 20th century. In 1913, a company began to construct water works and sewerage and water systems. Gorgas began to develop a campaign to rid Guayaquil of yellow fever in 1916, but it was Connor in 1918 who made lasting progress toward eliminating the disease. He was instrumental in the passage and strict enforcement of municipal ordinances and used the press to create public awareness. Then, as today, an inadequate water supply system was the major factor contributing to production of *Aedes aegypti*. Connor successfully used health education, legal measures and biological control (fish) as major weapons against the vector. In July 1920, the ecuadoran director of public health declared yellow fever eradicated.

An *Aedes aegypti* eradication program began in 1946, and the Pan American Health Organization (PAHO) declared Ecuador free of the mosquito in 1958. Surveillance was carried on until 1964 but was stopped until PAHO helped reorganize the work in 1967. An effective surveillance system was not put in place until 1974, when it became part of SNEM. From 1977 until 1988, a number of infestations of *Aedes aegypti* were discovered in the province of Manabi. In March 1985, a focus of *Aedes aegypti* was found in the parroquia of Sucre in Guayaquil, and the infestation spread to other parroquias.

Guayaquil experienced severe water shortages in 1987, and water is still being transported by truck to most of the city. The increase in storage of potable water on premises throughout the city brought extensive infestation of *Aedes aegypti*. At the same time, a shortage of Abate reduced the efficacy of SNEM's control activities. By late

1987 and early 1988, the house and Breteau indices had reached levels that would be dangerous should a dengue virus be introduced. Dengue I virus was found early in 1988, resulting in about 800,000 cases of dengue in Guayaquil. *Aedes aegypti* infestations are increasing in coastal Ecuador, and at the same time, dengue cases are spreading.

Concern is mounting that another dengue virus serotype will be introduced into Ecuador. The potential for an epidemic of DHF/DSS grows.

The Centers for Disease Control (CDC), PAHO and the government of Cuba furnished consultants at the time of the epidemic. Dr. Figueredo of Cuba assisted the Ministry of Health (MOH) in control activities and suggested a plan of all-out action to eradicate of *Aedes aegypti*. The plan is similar to the one used in Cuba. PAHO has helped develop a plan that has an immediate goal of control and an ultimate goal of eradication. Both plans assume the same or improved financial support over an extended time and do not take into account the time limit on the present funding by USAID/Quito. Both plans use a cyclic approach to control over wide areas of coastal Ecuador.

USAID/Quito furnished a VBC consultant in 1987 to assist SNEM in health education/community participation in *Aedes aegypti* control. The report's plan of action and recommendations were never implemented. During the Guayaquil dengue epidemic, mass media campaigns to educate and motivate the public about source reduction were produced. These campaigns had limited success during the epidemic. SNEM interest in this work is low because it has lost the two health educators assigned to the *Aedes* program. One of them was transferred to the office of the Subsecretariat of Health, so the expertise is not entirely lost.

Since 1987 the administration of the *Aedes aegypti* program has been in turmoil because of changes in leadership, relocation of the director's office, and use of private companies to conduct control activities. This transition period adversely affected every aspect of the program.

From the beginning of the USAID project, there have been a number of in-country training programs to upgrade SNEM's performance and to inform clinicians on current treatments for malaria and dengue. Several senior staff members have taken study tours to observe surveillance and control methodologies. A number of younger staff have been sent to the United States and elsewhere for postgraduate training. VBC helped SNEM establish a program to computerize program activities. USAID has furnished SNEM an adequate number of vehicle mounted ULV machines and vehicles. Given this support, the *Aedes aegypti* program should function better than it does.

Control activities at the time of the epidemic were reported to have brought the house index in all parroquias in Guayaquil to less than two percent, but beginning in 1989, the index began to rise. Little control was accomplished in 1989 because of labor problems, and the Subsecretariat de Health began transferring *Aedes* control activities to private companies with SNEM doing training, some supervision and control evaluation. The last treatment/surveillance cycle indicated a rise in *Aedes* indices after two cycles of relatively low indices. This rise could indicate a serious breakdown in control.

## 4. Observations and Findings

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### Control administration

The organization of *Aedes aegypti* control is extremely complicated. In SNEM's organogram, it is one of three technical disciplines (malaria control, *Aedes aegypti* control and control of other vectors) that function under the joint supervision of the Department of Epidemiology and the Department of Technical Operations. Many of the control activities in Guayaquil, however, are assigned to private companies directly under the Subsecretary of Health (Zone II). The director of the program has an office in SNEM Zone III; one medical supervisor is without an office, and the other has an office, a supervisor and clerical back up at SNEM headquarters. One medical supervisor supervises the private company assigned to the northern sector of Guayaquil, while the other handles the private company working in the southern sector. These individuals do not communicate with each other. Each medical supervisor has SNEM supervisors who evaluate and supervise certain functions of the private company. The private companies treat potable water containers with Abate sand granules, do source reduction and may conduct some health education.

In reality none of these functions is done adequately. Well over 10 percent of the houses are recorded as closed. In some areas it may approach 50 percent, and refusals are increasing. Each worker inspects and treats 40 or more houses almost every day. (Other programs average between 20 and 30 houses.) In some areas this larger number may be because the density of houses is high and only one or two large containers are used for potable water. Little or no source reduction or health education takes place, however.

The *Aedes aegypti* program has no vehicles of its own. Senior staff members generally lack transportation to follow up supervision. Even with transport, finding the workers of the private companies seemed difficult.

ULV applications of malathion are under the control of SNEM's chief of operations. His major objective is control of urban malaria. As a result, coordination of ULV applications in *Aedes aegypti* risk areas is poor. Widespread use of malathion against the two vectors in Guayaquil could increase the chances of producing resistance in *Aedes aegypti*.

Shortages of potable water in most of Guayaquil create the need for water storage facilities. Ground-level potable water tanks, usually a metal, 200-liter drum lined with cement, are the major *Aedes aegypti* larval habitat. The importance of these tanks may decline during the rainy season, but this needs to be documented. Other containers may contribute to *Aedes* breeding at that time. Their relative importance in Guayaquil, particularly in risk areas, should be determined.

Many aspects of source reduction/health education are hindered because garbage collection is irregular. Trash and garbage build up in the streets. Attempts to collect tires during the epidemic were said to have been successful, but now large numbers of tires are found along the streets. A newspaper article of September 24 declared the situation a sanitary emergency.

The SNEM entomology section receives specimens of mosquito larvae collected by the private company workers. This approach is poor because the workers frequently lack flashlights, collecting equipment, forms, vials and alcohol needed for the collections. The technical value of this activity is questionable. The private companies should be involved only in vector control, and their supervisors should evaluate only worker performance.

Control and surveillance in areas within the province of Guayas, but outside of Guayaquil are under the direction of SNEM's Zone III. This zone lacks staff for the Peninsula area but has workers under individual contract there. Zone III also has teams in El Oro. A control campaign has just finished in Salinas using the armed forces. We did not observe their work, but the *Aedes aegypti* program director called the work satisfactory. This coastal area is an important tourist area during part of the year (possibly three times during the rainy season: Christmas/New Year, Carnival and Easter).

Areas outside of Guayas and Guayaquil that have *Aedes aegypti* breeding are under the direction of the appropriate zone chief. The effectiveness of the work depends upon the zone chief, supervisors and workers. Labor problems and finances may act as constraints. We visited Zone VI in Manabi province. Since 1977, several urban areas have had re-introductions of *Aedes aegypti*. As a result, most of the staff has had years of experience in surveillance and control. The organization and quality of work are better in Manabi than other areas visited. Decentralization will give the zones greater independence for coordinated action of ULV and larval control in risk areas, resulting in improved control. Although widely dispersed, the infested areas are smaller and easily managed. Zone *Aedes* staff members are concerned about the lack of transportation.

Fifty new vehicle-mounted ULV machines (mounted on trailers) are in the coastal area. They are apparently in use when urban malaria occurs in areas that also may have *Aedes aegypti* infestations. No specific protocol exists to guide when or where they are used. No ULV machines were in use in Guayaquil during our visit. When not in use, they are covered with tarps. At SNEM headquarters in Guayaquil, however, the tarps did not cover the nozzles. Water in the nozzle and output tubes could damage the machine.

Probably the most common housing in the Guayaquil area consists of one- or two-room buildings constructed with a wood frame and split bamboo walls that should allow droplets to pass through from any direction. Roofing is either sheet metal or thatch. Vegetation is generally sparse because of the long dry season and poor water supply. Most water is carried from a common hydrant. ULV applications in this type of area should be effective, but some houses are built on steep hillsides or on stilts over water some distance from the road, where vehicle access is limited or impossible.

In other areas, houses are two- or three-story multiple-family dwellings built with concrete block or brick. Many have little or no space between buildings for ULV droplets to pass through. ULV applications in these areas may have little effect. Of the metropolitan areas of Guayaquil, perhaps 30 to 50 percent or more would be poorly suited to effective use of vehicle-mounted ULV

machines. Perhaps half a million or more of the people in the area would receive little benefit from spraying by vehicle-mounted machines.

There is no current information on dengue virus activity in Ecuador. The virus laboratory in the Instituto Nacional de Higiene (IN) has had no serological reagents for several months. Serum samples from suspect cases were recently sent to CDC's San Juan laboratories, but no results have been received. The virus laboratory cannot isolate dengue virus because of problems with cell culture. When reagents are available for testing, the results are sent to SNEM and other agencies. Circulation of the reports down to *Aedes aegypti* senior staff, however, is poor or nonexistent.

Following the 1988 epidemic of dengue, a Cuban advisor collected specimens for serology. The results of this survey are pending. Without reliable estimates of the percentage and geographic distribution of the population that had recent dengue infection, it is impossible to predict the numbers of people at risk of life-threatening infection with a second serotype.

A computer system was developed with assistance from the VBC Project. Computers are located at SNEM and in some zones. Dr. Roberto Mera was in charge of the computer office, but he is now doing further post graduate studies at Tulane University. The system is working but suffers from the lack of Dr. Mera's expertise. Data sheets covering the *Aedes* program through 1989 are readily available. Data for 1990 were available through the OPS office at SNEM, but did not appear to be available elsewhere. More thought should be given to the type of data needed to monitor the program.

During the dengue epidemic a committee coordinated activities between the virus laboratory at the IN, Epidemiology of the Province of Guayas Health Department, Subsecretariat of Health and SNEM. This committee no longer functions, and information flow and feedback are poor. The chief of the virus laboratory informs various agencies of serological data, but apparently these

data do not reach the *Aedes aegypti* control staff. This indicates that increased virus activity in a given location would not receive immediate vector control action. The committee should be reactivated (see Annex 3).

Field information is rarely used to make control decisions. Various individuals have the data, but they hold no meetings to plan or adjust control strategies. Consequently, the entire program is inflexible and has no goals or targets to evaluate.

### **Private companies**

In addition to SNEM staff, two private companies are contracted to do *Aedes aegypti* control. One works in the southern section of Guayaquil and the other in the northern section. This system was established because of labor strikes within SNEM. The idea of circumventing major delays in control is excellent, because the control strategy used in Guayaquil must follow a strict day-to-day cycle. This approach created problems, however. The contract is for only three months, and the field staff are paid the lowest basic salary. This has resulted in undertrained staff, rapid staff turnover, little dedication to work, poor quality of work, inadequately trained and organized company supervisors and the need for SNEM supervisors to duplicate work of the company supervisors. Company staff provide no real health education when they enter a premise. House inspections and larval control are done quickly, which indicates that breeding sources may be missed. Increasing numbers of houses are being closed to inspection, which produces more untreated foci of *Aedes aegypti* and confusion in data collected by SNEM and private company staff working in the same area.

Those working with the SNEM *Aedes aegypti* program think the work of the private companies is below standard and that the present working arrangement is unsatisfactory. The contract for the 300 private company employees is made by the Subsecretariat of Health, but evaluation is SNEM's responsibility; this arrangement further reduces the program's efficiency.

## Health Education/Community Participation

Health education and community participation functioned well during the epidemics. All avenues of mass media communication were covered (newspapers, all 18 radio stations, television, posters, meetings with civic organizations, private companies, schools and medical personnel). The result was a high level of awareness and cooperation. Once the epidemic subsided, the campaign's effectiveness decreased. At this moment SNEM thinks community participation is minimal. As a result of the labor strike at SNEM, the office of health education was transferred to the Subsecretariat building. The chief has received special training in the United States.

SNEM is revising health education pamphlets and other informative materials. Community participation is still low, but channels of cooperation exist from the epidemic, and the campaign could be reactivated. Consideration could be given to emphasizing the potable water tanks in risk areas. The education project should point out that each family is responsible for controlling breeding on its premises and that parents can protect the lives of their children by eliminating *Aedes* breeding, especially in potable water tanks. Other source reduction activities could be stressed immediately before and during the rainy season.

Senior *Aedes* staff have prepared a document suggesting that control emphasis be shifted to community participation and legal measures. The document stresses the need to improve the potable water system. No action has been taken.

During visits to the two private company work areas we observed that the workers were rarely used for health education. No posters about *Aedes aegypti* or dengue were noted in the city. The people interviewed in the field, however, knew dengue and knew that a mosquito was the vector.

Sections of the World Health Organization (WHO) book on diagnosis and treatment of dengue hemorrhagic fever have been reproduced, and about 500 copies have been distributed to doctors at hospitals and health centers. No one was identified with personal experience in diagnosis and treatment or clinical experience with DHF. The lack of specialized training among medical personnel could have serious consequences should an epidemic occur.

## 5. Discussion

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### Administrative issues

Many of the technical objectives in our scope of work could not be adequately addressed because of the fragmented administrative structure of the *Aedes* program. This problem also existed at a higher level, where virus laboratory, epidemiology staff of the provincial health sections, the Subsecretariat of Health and SNEM are all involved with virus surveillance and mosquito control.

The fragmentation of administrative activities of the *Aedes aegypti* program located at SNEM and Zone III, in addition to offices of the private companies located elsewhere, obviously interferes with lines of communication and management. An organogram exists for SNEM that proposes the program function as a more or less separate unit of SNEM. We think action along these lines should take place. The program could be physically located at SNEM or at Zone III or elsewhere, but all senior staff should have offices together and should be required to take part in all planning and evaluation exercises.

The program should have enough autonomy to function effectively. Autonomy would require adequate vehicles, storage and office space, control over allocation and dispersal of funds budgeted to the program, control over immediate staff, enough equipment for routine control activities, and access to equipment to handle emergency situations.

The program lacks the tools of effective management such as clearly defined objectives and a flexible control strategy. A number of official documents define long-term objectives as reduction of *Aedes* indices to a certain level and eventual eradication of the vector. These documents lack immediate objectives, goals and deadlines. As a result, if the strategies presented in the documents were ever implemented, short-term planning and evaluation would not be possible. At this time the documents are only plans.

Actions need to be stratified to fit the vector problem within small areas defined by geographical location, political organization, epidemiological indicators or entomological data. The current strategy is global and cyclic, resulting in wasted resources and lack of effectiveness.

Information and tools exist to develop a flexible strategy. The lack of effective communication between parties of the subsecretariat, SNEM and others, however, makes strategy and program implementation impossible. Many of these problems resulted from labor-management difficulties within SNEM and the need for action at the time of and immediately following the dengue epidemic. The time appears ripe, however, to study the current program and install changes that would defuse tensions and improve effectiveness.

Guayaquil has a population much greater than 2 million people. The size of the city makes the logistics of effective management difficult, particularly when program staff lack the transportation to evaluate the private companies' work. The SNEM medical officers and senior supervisors share vehicles; as a result, much of the daily work has not been supervised adequately. The program has one health educator without transportation, making it impossible to visit many schools.

There appeared to be confusion about day-to-day duties. Our observations point to a need to revise job descriptions at all levels in order to define exactly the duties of each staff member. Such a revision would make staff evaluation, training and discipline easier.

## **Technical issues**

Recommendations from various consultant reports and other documents reflect different philosophies, such as eradication or control. Many were written for a specific time and situation, and some follow the objectives of the consultants' organizations. All technical recommendations should be reviewed by the local experts and followed only within the reality of financial and resources available and the priorities of the given vector-virus situation.

Many of the technical problems have their origin in management and must be solved accordingly. Backpack space-spraying equipment is housed at the subsecretariat and is used without coordinating with the SNEM Chief of field operations. ULV trailer- and vehicle-mounted equipment has been purchased by USAID for malaria control and by SNEM/ Subsecretariat for urban *Aedes* control. All equipment is controlled by the chief of field operation. As a result, the *Aedes* program does not always know where malathion is being applied.

We conclude that space spraying of adulticides should not be part of the routine *Aedes aegypti* program. ULV applications could be considered if dengue is in the city or in neighboring cities, if the density of *Aedes* is high, or if a new serotype is introduced. Risk areas, determined by *Aedes aegypti* densities or serological surveillance, should receive priority. Space spraying should be linked to stratification and the vector's susceptibility to the available insecticide. This approach requires constant monitoring of insecticide resistance and information on alternative adulticides. The strategy for ULV ground application is under study in Venezuela. Any forth-coming recommendations should be tested in Guayaquil.

There are major discrepancies between reports about the quality of control achieved by larviciding with Abate. Indices reported by the private companies and SNEM supervisors differ to the point that all surveillance is questioned. Without up-to-date, reliable information, the program is worthless. The Abate teams should not collect *Aedes* larvae because it is not the objective of their work. If it is done at all, this activity could be done by SNEM supervisors. They could check for breeding in Abate-treated containers (a breakdown in control) and identification of container-breeding mosquitoes (surveillance for *Aedes albopictus*).

Routine larviciding as now done is costly and increases the chance of resistance in the mosquito population. Furthermore, the rapid turnover of water in many ground water tanks and the large number of closed houses decreases the efficacy of Abate treatment. If *Aedes aegypti* surveillance improves, Abate treatment should be limited to clearly defined risk areas where the major breeding source is potable water containers. If the present uncertainty about its efficacy continues, Abate treatment should be ended.

Selecting defined risk areas will require changes in the computer program to select areas within the parroquia that show pockets of *Aedes aegypti* breeding. These areas would have to be revisited to determine principal larval habitats and control strategy.

Outside of Guayaquil, the use of Abate in infested urban areas appears to be working. These are smaller, more manageable areas, and the work is done by SNEM staff. *Aedes aegypti* can be controlled and even temporarily eradicated in these cities. Under such conditions, SNEM could continue with its larviciding. In areas with foci off major transport routes and in less populated areas, however, continued inspection and treatment with Abate is questioned.

Ecuador has laws to enforce source reduction and other measures conducive to vector control. Legal measures were used effectively in the past to control yellow fever. They are effective if uniformly applied, but the will of the government and the people might not warrant their use.

## 6. Conclusions

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1. Administratively the *Aedes aegypti* program is badly fragmented and functions without clear directives or realistic goals.
2. Vector surveillance and control activities are aimed at *Aedes aegypti* eradication, but existing resources are inadequate to achieve this goal. Continued use of eradication protocols may be counterproductive because it may increase the development rate of resistance to Abate and malathion and consume resources outside of high-risk areas.
3. Information about *Aedes aegypti* distribution and relative densities essential to surveillance and control evaluation is believed to be unreliable.
4. High *Aedes aegypti* indices continue in some parts of Guayaquil that are under vector control. These areas are considered to be areas of high risk for dengue.
5. The potential for DHF in Ecuador is great because of high *Aedes aegypti* infestations in parts of Guayaquil and the presence of several active dengue serotypes in nearby countries.
6. Dengue virus activity and case distribution are poorly known because the virus laboratory lacks reagents and a dengue surveillance system. Information exchange between institutions has deteriorated.

## 7. Recommendations

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### The *Aedes aegypti* program

1. The Ministry of Health should review the program's objectives and its administrative structures in order to provide clear long- and short- term goals and a rational work plan and functional organization to achieve those goals.

**Comments:** Clear goals, objectives and targets, with specific time frames, should be developed against which progress can be measured and so that resource allocation and methodologies can be adjusted. Work plans for each organizational segment should be developed to achieve objectives in concert with the objectives of other organizational segments. Mechanisms should be developed to ensure that the work of each individual and program segment is functioning in concert rather than competing for limited resources.

- a) Entomologic surveillance should be strengthened to provide timely and reliable indices of *Aedes aegypti* infestations in known high-risk areas and to evaluate control efforts, control methods and levels of insecticide susceptibility. SNEM *Aedes aegypti* personnel with the necessary experience should be used in this effort to provide the most reliable information possible. They must be provided with essential equipment and transportation.
- b) Control work should be guided by mosquito and disease surveillance data that, along with other factors, are used to stratify areas for attention. In the absence of disease transmission, control efforts should be concentrated in areas with high human

population densities and high house indices. Continued high mosquito indices in such areas should trigger a review of the quality of work being done and possible changes in control methods in those areas.

- c) Abate larviciding should not be done in areas of low house indices while other high-risk areas continue to have house indices above five percent.
- d) ULV spraying with vehicle-mounted machines should be reserved for epidemic control and for high-risk areas when there is evidence of nearby transmission. ULV machines, vehicles and ULV machine operators should be immediately available for *Aedes aegypti* emergency control when and where they are needed as dictated by mosquito and virus surveillance and occurrence of cases.
- e) Application of residual spray indoors using the backpack machines and perifocal spraying of malathion suspensions should be discontinued if there is no specific evidence of their effectiveness.
- f) SNEM *Aedes aegypti* personnel should be used as part of the DHF surveillance system in high-risk areas. They should be instructed to ask about dengue-like illness in the houses in which they are working and report suspect cases to the provincial epidemiologist and the virus laboratory for follow-up.
- g) Health education/community participation should be reactive and used as an integral part of the control effort. Special efforts should be made in high-risk areas with continued high house indices.

- h) Health education staff should be increased to provide continual motivation to primary and secondary schoolchildren. Educational materials should cover the mosquito, the virus and the disease, stressing practical means of personal protection. Prevention of mosquito breeding in potable water tanks should be given priority. The health education staff should revise and test all existing materials and maintain and improve communications with all groups involved in the past dengue epidemic. The staff should help design training courses for medical personnel and train staff from private companies.**
- i) Community organizations, churches, schools, civic clubs and other community-based agencies should be informed about actions they could take during a dengue emergency. Immediate medical assistance should be stressed where DHF/DSS is suspected. Campaigns to reduce breeding sites immediately before the rainy season might be initiated. Information about personnel protection should be distributed to all participating agencies as well as information on ways to contact vector control and physicians working in the area.**
- j) Inasmuch as biological control using fish was successful in the yellow fever eradication campaign and is recommended by SNEM as a control mechanism, research on species of fish and other biological agents, mass-rearing techniques, and distribution, including the selection of sites, is suggested.**

## Dengue

1. A national committee for dengue should be established, and it should hold regular meetings. A major objective of the committee should be to develop a contingency plan for an epidemic. The plan should designate specific duties to each member. (See Annex 3).

**Comments:** The committee should consist of staff from the virus laboratory of the INH, epidemiologists from the Subsecretario de Salud and Direccion Provincial de Salud de Guayas and other coastal provinces, vector control experts from SNEM, representatives from hospitals, especially children's hospitals, and possibly medical societies.

During emergencies the committee membership should include representatives from the armed forces, civil defense, civic organizations and other pertinent ministries, such as agriculture. The committee should have an inventory of hospital beds, supplies for management of shock cases, vector control supplies and other equipment, such as vehicles. It should encourage education of medical personnel and the public, particularly on the recognition of DHF symptoms and the need for immediate medical care (see Annex 3).

2. The Ministry of Health should develop a training program for medical personnel on the diagnosis and management of DHF/DSS.

**Comments:** Fellowships should be sought to send a few clinicians for training in countries that have experienced DHF/DSS outbreaks. Consultants should be requested from donor agencies to provide workshops and other training at hospitals and clinics in Ecuador. A clinician should be appointed to coordinate training and clinical case management during an epidemic.

3. Dengue surveillance should be expanded and provision made to ensure that involved institutions coordinate closely and share information promptly.

**Comments:** Dengue surveillance has deteriorated, and with the limited resources available for control of *Aedes aegypti*, early recognition of new dengue serotypes in Ecuador and demonstration of high-risk areas becomes more important. Rapid exchange of information will be crucial in reducing the risk of transmission as much as possible with available resources.

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**Annex 1.A  
Officials Contacted**

**USAID**

**Quito**

Sr. William R. Goldman, Jefe Division de Salud  
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Sra. Irene Barriga, Asistente, Division de Salud  
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**Guayaquil**

Ing. Felipe Arellano (LTA) Asesor Principal del Proyecto

**Ministerio de Salud Publica**

**Quito**

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Dr. Julio Larrea, Director General

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Dr. Luis Enrique Diez, Director Tecnico de la Subsecretaria  
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Ing. Julio Yopez Erazo, Jefe de Operaciones de Campo

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Dr. Hugo Jurado, Director del Programa de Control de  
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Dr. Jorge Peñaherrera, Jefe de Zona VI-Manabi

Sr. Luis Segura, Supervisor de Programa de Control de  
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Sr. Teofilo Escobar, Supervisor de SNEM Zona III

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Dra. Aracely Alava A, Jefe Departamento de Virologia

**Annex 1.B  
Contacts and Activities**

**September**

- 14** Meetings with USAID and VBC Staff at VBC, Arlington, Va.
- 15** Travel to Quito, Ecuador
- 16** Free
- 17** Meeting at Health Section, USAID/Quito  
Meeting at Ministry of Public Health, Quito  
Meeting at OPS, Quito
- 18** Travel to Guayaquil  
Meeting at USAID Project  
Meeting with SNEM staff
- 19** Meeting at OPS, Guayaquil  
Discussions with Dr. Jorge Moreira, SNEM
- 20** Meeting with Ing. Felipe Arellano  
Discussions with Ing. Julio Yepez and Dr. Jorge Moreira, SNEM  
Discussions with Dr. M. Arzube and Dra. A. Alava, IN
- 21** Visit to area where control brigades were active and to areas of Guayaquil that had large numbers of dengue cases during the 1988 epidemic
- 22** Review SNEM documents and consultant reports related to *Aedes*/dengue control
- 23** Free
- 24** Visit to private company field activities and SNEM evaluation in Guayaquil

- 25 Meeting with Subsecretary of Health, region II, and Director Technical of Health, Region II  
Visit to Manabi, ZONEA VI-SNEM
- 26 Meeting with SNEM health educator at Subsecretariat of Health  
Visit to Santa Elena to observe work of individually contracted *Aedes aegypti* staff (Zone III)
- 27 Meeting at *Aedes aegypti* program headquarters at SNEM  
Zone III
- 28 Preparation of report  
Meeting at SNEM Zone III
- 29 Preparation of report.  
Meeting with director of SNEM

## October

- 1 Meeting with epidemiologist of provincial health office and with staff of *Aedes aegypti* program
- 2 Debriefing at SNEM-USAID/Guayaquil  
Meeting of a potential national committee for Dengue
- 3 Revision of report
- 4 Debriefing at USAID/Quito

## **Annex 2**

### **Factors That Should be Considered in Stratification**

#### **I. Factors that contribute to the risk of rapid transmission and should guide stratification of areas for priority for both routine and emergency control**

- A. Human population density
- B. Interarea human travel and migration
- C. Antibody prevalence for the virus serotype
- D. *Aedes aegypti* populations

- 1. Actual indices of *Aedes aegypti* (house, Breteau)
- 2. Potential for larval production (types and numbers of containers)
- 3. Potential for adult survival (harborage)

#### **II. Factors to guide routine control methods**

- A. Acceptance of *Aedes aegypti* personnel into the houses
- B. Evidence of successful control (method/compound)
- C. Evidence of insecticide resistance
- D. Evidence of control failures

#### **III. Factors to guide emergency control methods**

- A. Accessibility for ULV spraying (vehicle mounted)
- B. Evidence of successful control (method/compound)
- C. Evidence of resistance
- D. Evidence of control failures

Evidence of many cases in an area may influence priorities for emergency control, but consideration should be given to the fact that transmission levels may already be declining in the area by the time an outbreak is noted and it could be too late for emergency control in that area. Information on dengue activity must be provided immediately to the *Aedes aegypti* control program.

#### IV. Initiation of stratification

Stratification should be started immediately to guide surveillance and control activities in use now when dengue activity is apparently low and to prepare for changes in priorities and methods needed during emergencies. Stratification must be dynamic. The priority for program efforts must also change as new information becomes available about epidemiologic and entomologic conditions, efficacy of methods, insecticide susceptibility levels, changes in availability of resources and other factors. The following steps should be followed to implement and benefit from stratification.

1. Classify all areas into one of three strata (using the smallest identifiable political/geographical subdivision for which stratification criteria are available).
2. Develop a realistic work plan that will provide
  - A. Monthly *Aedes aegypti* surveillance in all high-risk urban areas. Systematic or random sampling should be used to provide larval indices. Appropriate larviciding, source reduction and educational efforts should be used in high-risk urban areas to maintain house indices below five percent. Should larval indices remain higher than five percent after control methods have been applied, an evaluation team should investigate and alternate control measures should be considered.
  - B. *Aedes aegypti* surveillance in approximately one-third of the intermediate-risk strata each month. Control measures should be applied only when the area has a house index greater than five percent.

- C. Public education using mass media to describe specific self-help measures for rural areas, small population centers, and low-risk urban areas, which would be at the lowest stratum. Because of lack of resources, they would not be included in surveillance or control efforts while high or intermediate-risk urban areas are still receiving attention.
3. Review and reclassify area strata in light of new information each month.

### **Annex 3.**

## **Guide for Preparing a Contingency Plan for Dengue and DHF Outbreaks in Ecuador**

### **1. Background and rationale**

Following the 1981 epidemic of dengue hemorrhagic fever in Cuba, cases of DHF have been reported from a number of countries in the Americas. The most recent DHF outbreak occurred in Venezuela in 1990.

Guayaquil experienced an epidemic of dengue (serotype I) in 1988. This virus has spread to several *Aedes aegypti*-infested areas in Ecuador. Other dengue serotypes are circulating in Columbia and in Venezuela. It is feared that one of these serotypes will arrive in Ecuador in the near future and that DHF cases will occur.

The present *Aedes aegypti* control program in Ecuador requires changes before the risk of dengue can be reduced. A source of funding (USAID) for this campaign is scheduled to finish at the end of 1991. This loss of funding could be disastrous unless strategy is changed immediately to reflect the situation and resources in Ecuador. The strategy of attempting to inspect and larvicide in all infested areas should be abandoned. Efforts should be directed at reducing the risk in high-risk areas having high indices of *Aedes aegypti* before using precious resources in areas of low risk.

The Ministry of Health should form a committee to provide structure and to develop a contingency plan for rapid, effective actions in the event of epidemic dengue, DHF or yellow fever. The plan would provide for effective virus and vector surveillance, rapid information exchange to key individuals and emergency vector control, along with effective case management should grave illness occur.

## **2. The National Committee for Control of Epidemic Dengue**

- a. Committee members should be appointed by the highest possible authority in the Ministry of Health. The chairman should have the right to report directly to the minister.
- b. Core committee membership should include the following groups or individuals:
  1. Chief of the virus laboratory (IN)
  2. Chief of the *Aedes aegypti* program (SNEM)
  3. Epidemiologia  
Subsecretaria de Salud Zone II  
Direccion Salud, Prov. Guayas
  4. Director of a hospital (pediatric).
- c. Additional members could include representatives from groups such as these:
  1. Armed forces
  2. Red Cross
  3. Civic groups (rotary, Lions)
  4. Medical associations, national or provincial
  5. Other hospitals
  6. OPS and USAID/Quito
  7. Health educator, SNEM
  8. Other ministries.

The committee should develop its objectives in line with actions to be taken before, during and after an epidemic. Major objectives should address the following:

1. Timely and appropriate virus and vector surveillance
2. Rapid exchange of information to all key individuals
3. Timely and appropriate vector control
4. Inventories of all emergency resources (medical supplies, vector control equipment and supplies, and health education materials)

5. **Modification of actions as needed to meet changing situations**
  6. **Identification of sources of outside assistance**
- e. **The committee should define both technical and administrative responsibilities and assign duties appropriately. Definitions should be formulated for different phases of an epidemic. A plan appropriate to each phase should be developed.**
  - f. **The committee should develop a relationship with agencies involved in dengue control in other countries, including Colombia, Venezuela, and Peru.**
  - g. **The committee must meet regularly, and key members should either be present or ensure that they are represented by a suitable alternate. The secretary of the committee should call special meetings as needed and should maintain regular contact with other members.**
  - h. **A budget and a regular meeting place should be provided by the Ministry of Health.**
  - i. **The committee should study contingency plans developed by the VBC project for the Dominican Republic and Honduras for ideas on developing an emergency plan.**

### **3. The emergency plan**

#### **a. Preparatory phase (immediately)**

The virus laboratory should maintain reagents and supplies to ensure a continuous flow of work. The committee must coordinate collecting and testing samples to get the most important information from the number of samples the laboratory can process.

The committee should establish a sentinel system of hospitals, clinics and private physicians and have the resources to maintain contact and obtain specimens.

The epidemiologists of the various provinces should inform the virus laboratory of suspect cases for investigation and receive results on specimens tested.

Seroepidemiological surveys should be done in risk areas and selected coastal cities. SNEM should use the results to stratify risk areas. (See Annex 2.) The *Aedes aegypti* program should follow the stratification plan outlined above and adjust activities accordingly and as serological surveys indicate.

The Colegios de Medicina, Ministry of Health and the university faculties of medicine must improve physicians' awareness of dengue. Training should concentrate on improving diagnosis and treatment. Expertise in treating DHF is lacking in Ecuador. The committee member from the clinical discipline should develop training modules and continuously evaluate physicians' awareness. The booklet condensed from the OMS Guide to the Diagnosis, Treatment and Control of Dengue Hemorrhagic Fever should be revised in light of the Venezuelan experience and distributed widely.

The SNEM *Aedes aegypti* program must revise its activities to concentrate on reducing mosquitos in risk areas instead of routinely applying insecticides to the total area. The present approach increases the potential for insecticide resistance and limits the effectiveness of a rapid response.

The director of the *Aedes aegypti* program and his senior staff should develop a contingency plan for *Aedes aegypti* control. Any plan should be tested through research and program evaluation, and altered accordingly.

Because the majority of breeding sites are stored potable water tanks, consideration should be given to developing public awareness about each family's responsibility to control its own sources. Furthermore, community participation should be directed toward this primary source rather than diluting effects on coverage by talking about all potential breeding places. Awareness and participation should be keyed to the area's risk level and to the season (rainy-dry).

The director of the *Aedes aegypti* program should maintain an inventory of staff by designated duty and identify other sources of manpower. Inventories of application equipment and spare parts, insecticide on hand and ordered, and location and operating condition of vehicles should be kept current. We could identify only one vehicle assigned to the *Aedes aegypti* program. None of the other suggested core committee representatives has enough vehicles to function at the level needed during an emergency.

Data collected from the private companies and SNEM seem to indicate that control is breaking down in Guayaquil. Although there are a number of possible reasons for control breakdown, recent insecticide resistance tests conducted by Dr. Nelson and SNEM suggest that this might be part of the problem. SNEM must increase susceptibility surveys for Abate/malathion resistance, especially in high-risk areas. SNEM also must begin research to select possible alternative insecticides.

Vector control has a supply of new ULV space-spraying equipment and vehicles suitable to handle emergencies. Vehicles are assigned to malaria control, however, so arrangements must be made for rapid transfer during an emergency. Vehicles and equipment deteriorate rapidly in vector control, so a list of suppliers and current prices should be maintained. The availability of hospital beds and supplies for treatment of DHF/DSS patients *must* be determined.

#### **b. Alert phase**

Identification of a new serotype, occurrence of DHF/DSS or a substantial increase in dengue cases in Ecuador should stimulate the alert phase. During this phase, additional training should intensify surveillance staff awareness and vector control should be increased in specific risk areas.

Implement the vector control plan of action. This plan should depend upon the status of control stratification within the various political/geographical areas.

- o Intensive dengue/*Aedes aegypti* information stressing personal protection measures and community participation (define risk areas) should be disseminated.
- o Larviciding, source reduction and increased entomological surveillance in risk areas should be considered.
- o Prepare for possible use of ULV equipment.

**c. Emergency phase**

- o Declaration of an emergency should depend upon the criteria established by the National Committee.
- o Declaration of an emergency should trigger an immediate increase in the national committee's coordination activities, especially of disciplines or group functions not represented by the core membership. Greater committee membership and auxiliary staff should be considered.
- o Dissemination of accurate information is essential. There should be only one spokesperson during an epidemic. Information should include case reports, public awareness items, location of spraying and other vector control activities, and intergovernmental agency involvement.
- o Vector control should concentrate on areas reporting dengue cases and areas at risk as determined by entomological surveillance. ULV applications could be considered but should follow any new recommendations on methodology coming from the study in Venezuela. Any decision for aerial ULV application should depend upon the number and distribution of cases and the effectiveness of existing ground operations. Aerial ULV should be placed in the hands of professionals. All emergency control measures should be evaluated and adjusted accordingly.

## **Annex 4.**

### **Conclusiones y Recomendaciones**

#### **Conclusiones**

1. Administrativamente el Programa *Aedes aegypti* está mal fragmentado y funciona sin directrices claras o metas realísticas.
2. Las actividades de vigilancia y control del vector tienen como meta la erradicación del *Aedes aegypti*. Sin embargo, los recursos existentes son inadecuados para alcanzar este objetivo. El uso continuo de protocolos de erradicación pueden ser contraproducentes ya que pueden incrementar la tasa de desarrollo de la resistencia al "abate" y al "malathion" y dar como resultado el consumo de productos externos fuera de las áreas de alto riesgo.
3. Se cree que la información actual sobre la distribución y densidad relativa del *Aedes aegypti*, esencial para la vigilancia y la evaluación del control, *no es confiable*.
4. Altos índices de *Aedes aegypti* continúan en algunas partes de Guayaquil que están bajo control y que son consideradas como áreas de alto riesgo para el dengue.
5. El potencial para el DHF en Ecuador es grande, debido a las grandes infestaciones de *Aedes aegypti* en algunos sectores de Guayaquil y a los varios serotipos de dengue de los países vecinos.
6. La actividad del virus del dengue y la distribución de los casos es poco conocida debido a que el laboratorio del virus carece de reagentes y debido a que el sistema de vigilancia del dengue y el intercambio de información entre las instituciones se ha deteriorado.

## **Recomendaciones**

### **1. El Programa *Aedes aegypti***

**El Ministerio de Salud debería revisar los objetivos del programa y sus estructuras administrativas con el fin de definir metas de largo y corto alcance, un plan de trabajo racional y una organización funcional es necesaria para poder alcanzar esos objetivos.**

**Comentarios:** Se deberán desarrollar objetivos y metas claras con periodos específicos de tiempo para cada uno en las que se pueda medir el progreso de los mismos y se puedan realizar los ajustes relacionados con la distribución de recursos y las metodologías. Los planes de trabajo para cada segmento organizativo deberán desarrollarse para alcanzar los objetivos conforme a los objetivos de otros segmentos organizativos. Se deberán desarrollar mecanismos para asegurar que el trabajo individual y los segmentos del programa estén funcionando de común acuerdo con otros individuos y otros segmentos en lugar de estar compitiendo por recursos limitados.

- a) La vigilancia entomológica deberá ser reforzada con el fin de proporcionar índices oportunos y confiables de infestaciones del *Aedes aegypti* en áreas conocidas como de alto riesgo; asimismo, y con el fin de tener una evaluación precisa de los métodos de control y de los niveles de susceptibilidad de los insecticidas, el personal del SNEM que tiene la experiencia necesaria debería ser utilizado en este esfuerzo con el fin de proveer la información más confiable posible. Para realizar esto, se les debe proporcionar el equipo esencial y el transporte.
- b) El trabajo de control deberá ser guiado por la información sobre la vigilancia de la enfermedad y del mosquito, que, conjuntamente con otros factores, deberán ser usados para estratificar las áreas de atención. En ausencia de la transmisión

de la enfermedad, los esfuerzos de control deberán concentrarse en las áreas altamente pobladas. Los altos índices de mosquitos en las áreas críticas deberán analizarse y deberán llevar a una revisión de la calidad de trabajo que se está haciendo, llevando a cabo cambios en los métodos de control de esas áreas si fuere necesario.

- c) La colocación de "abate" no deberá hacerse en las áreas que tengan bajos índices de "vivienda" mientras que otras áreas de alto riesgo continúan con índices "de vivienda" sobre el 5%.
- d) El rociamiento de ULV con máquinas instaladas en vehículos deberá reservarse para el control epidémico y para áreas de alto riesgo durante periodos en donde exista la evidencia de una transmisión cercana. Las máquinas ULV, los vehículos y los operadores de las mismas deberán estar disponibles para cualquier control de emergencia del *Aedes aegypti* cuando y donde se los requiera conforme se procede en la vigilancia del mosquito y del virus y en la presentación de casos de este tipo.
- e) Se deberá reactivar y utilizar la educación para salud y la participación de la comunidad como una componente integral de los esfuerzos de control, con énfasis especial y esfuerzos específicos en áreas de alto riesgo que tengan índices habitacionales altos y continuos.
- f) La aplicación de spray residual en los interiores usando máquinas tipo "mochila", así como el rociamiento perifocal de las suspensiones del "malathion", deberán discontinuarse cuando no exista una evidencia específica de su efectividad.
- g) El personal del Programa de *Aedes aegypti* del SNEM deberá ser utilizado como parte del sistema de vigilancia del DHF en áreas de alto riesgo, instruyéndolos a que pregunten acerca de enfermedades parecidas al dengue en las casas que visitan y que reporten los casos sospechosos al Laboratorio de Virología del INHMT para que se haga un seguimiento.

- h) El personal de Educación para la Salud debería ser incrementado para realizar una motivación continua en escuelas primarias y secundarias. Los materiales educativos deberán contener una cubierta del mosquito vector, información acerca del virus y la enfermedad y la protección personal, además de la prevención de las fuentes de proliferación en tanques de agua potable deberá ser considerado como prioritario. El personal de Educación para la Salud deberá revisar y verificar en el campo todos los materiales existentes, manteniendo y mejorando la comunicación con todos los grupos involucrados durante la pasada epidemia de dengue. El Departamento de Educación deberá ayudar en diseñar y dar adiestramiento al personal médico, enrolando en la capacitación de igual manera al personal de las Empresas Privadas.**
- i) Organizaciones comunitarias, iglesias, escuelas, club cívicos, otras comunidades de base y agencias, deberán ser constantemente informadas acerca de las acciones en las cuales ellos podrían colaborar durante una emergencia de dengue. Asistencia médica inmediata deberá ser requerida donde DHF/DSS sea sospechado. Campañas para reducir inmeditamente los sitios de proliferación antes de la estación de lluvias podrían estar iniciándose. Información sobre protección personal debería ser distribuida a todas las agencias participantes, como una buena vía de contacto de vector control y los médicos que trabajan en el área.**
- j) Mecanismos de control biológico por medio de peces fueron exitosos durante la campaña de erradicación de la fiebre amarilla, por lo que es recomendado al SNEM como un mecanismo de control, desarrollar la investigación de especies de peces larvivoros y de otros agentes biológicos, desarrollar técnicas de crianza y distribución incluida la selección de sitios se sugiere implementar.**

## 2. Dengue

1. El Comité Nacional del Dengue deberá reorganizarse y se deberán realizar reuniones periodicas. El objetivo principal de este Comité deberá ser desarrollar un plan de contingencia a ser usado durante una epidemia. Asimismo, se deberán asignar deberes especificos a cada miembro.

**Comentario:** El Comité deberá estar formado por el personal del Laboratorio del virus del Instituto Nacional de Higiene, por epidemiólogos de la Subsecretaria de Salud y de la Dirección Provincial de Salud del Guayas y de otras provincias, por expertos de control de vectores del Servicio Nacional de Erradicación de la Malaria, por representantes de los hospitales, especialmente de hospitales de niños, así como por instituciones médicas.

Durante emergencias, el Comité deberá incluir a representantes de las Fuerzas Armadas, Defensa Civil, organizaciones cívicas y a otros ministerios como el de Agricultura. El Comité deberá tener un inventario de las camas de los hospitales, de los suministros para el manejo de casos de shock, de los suministros de equipos de control del vector y del equipo, así como de otros equipos como vehículos. El Comité deberá apoyar la educación del personal medio y del público, particularmente en lo que se refiere al reconocimiento de los síntomas de DHF y a la necesidad del cuidado médico inmediato.

2. El Ministerio de Salud deberá desarrollar un programa de entrenamiento para el personal médico sobre el diagnóstico y manejo del DHF/DSS.

**Comentarios:** Se deberán buscar fondos para becas para enviar a algunos clínicos para entrenamiento en países que hayan experimentado brotes de DHF/DSS. Se deberá solicitar consultores de agencias de cooperación para que promuevan talleres de trabajo y otro tipo de entrenamiento

en hospitales y clínicas del área de la costa del Ecuador. Se deberá nombrar un clínico para que coordine este entrenamiento y el manejo del caso durante una epidemia.

3. La vigilancia de dengue deberá ser expandida. También deberá hacerse una provisión para asegurarse una coordinación más cercana de las instituciones involucradas y una coparticipación oportuna de la información.

**Comentarios:** La vigilancia del dengue se ha deteriorado y con los limitados recursos disponibles para el control del *Aedes aegypti*, un reconocimiento temprano de nuevos serotipos de dengue en Ecuador y la identificación de áreas de alto riesgo, asumen una mayor importancia. Un intercambio rápido de la información será crucial en el caso de una posible epidemia.

## **Anexo 5**

### **Resumen de la Reunion**

Resumen de la Reunion de *Aedes* con Personal de la Subsecretaria de Salud, INHMT, Medicos del Programa de Control de *Aedes* y Consultores de A.I.D. y de PAHO/WHO.

Participantes en la Reunion Celebrada en la Subsecretaria de Salud-Region II el dia Martes 2 de Octubre de 1990:

Dr. Luis Enrique Diez T, Director Tecnico, Subsecretaria de Salud R-II

Dr. Victor Gonzalez, Ecuador para la Salud-SNEM

Dr. Bolivar Cardenas, Jefe de Epidemiologia de la Direccion Provincial de Salud

Dra. Aracely Alva, Jefe del Depto. de Virus del INH

Dr. Hugo Jurado, Director del Programa de *Ae aegypti*

Dr. Eduardo Gomez, Medico del SNEM

Dr. Alex Drouet, Epidemiologo

Dr. Cesar Pastor, Epidemiologo

Dr. Fausto Caicedo, Epidemiologo

Dr. Robert Tonn, Consultor A.I.D.

Dr. Don Eliason, Consultor A.I.D.

Sr. Juan R. Unda, Consultor PAHO/WHO

Sr. Jose Recarde, Estadistico de la DPS

Sra. Mercedes Ordonez, Estadistico de la DPS

### **Puntos discutidos**

1. La reunión dió comienzo a las 9:45 a.m. Posteriormente el Dr. Diez se incorporó, presidiendo la reunión.
2. El Dr. Hugo Jurado, comenzó una exposición sobre la situación actual del *Aedes* en la Ciudad de Guayaquil, Cantones Sta. Elena; y las Provincias de Esmeraldas, Manabi, El Oro y Los Rios.

Se indicó que los índices del 5to.ciclo (periodo del 2 de julio al 31 de agosto de 1990) son inferiores al 5%. Que la Ciudad de Guayaquil está bajo la dirección técnica de 2 Médicos, Dr. Eduardo Gómez, que trabaja con recursos humanos de la Empresa Privada Orgaservi, que tiene 144 personas en servicio activo y trabajan en las Parroquias F. Cordero, Letamendi, G.Moreno, Olmedo y Ximena.

El Dr. Jorge Moreira trabaja con 143 hombres de la Empresa Privada Vigmansa en las 9 Parroquias restantes. Que 44 hombres de la planta del SNEM pasarán a trabajar en la Parroquia Letamendi, por problemas de relaciones humanas.

Se resumió que en Enero/Febrero de 1990 hubo una epidemia de Dengue serotipo 1, las medidas de control lograron reducir los índices <5%, un Consultor Dr. R. Figueredo, estimó la epidemia en 75.000 personas, que contraste con la opinión del Dr. Michael Nelson de OPS que la epidemia no afectó a más de 10.000 personas.

En la Provincia de Manabi solo 2 localidades tienen índices altos y son Jipijapa y Pajan. En el Oro, solo Pasaje y el Guabo, tienen índices mayores a 5%; y, en Los Rios se ha eliminado el vector.

3. Puntos relacionados con el sistema de información procedente de las Unidades Operativas, se resumió en un cuadro presentado que resume la situación de las semanas epidemiológicas 1 a 38 (periodo del 1o. de Enero a 22 de Septiembre 1990).
4. La Jefe del Depto. de Virus del INHMT informó que durante Julio/Agosto el procedimiento de las muestras para serología se interrumpió, debido a falta de reactivos. Que recientemente se recibió el material y se está trabajando para poner al día los resultados.

5. El Consultor de OPS indicó que el SNEM ha venido realizando pruebas de resistencia de larvas de *Aedes aegypti*, durante el año en diferentes poblaciones, que la OPS ha gestionado la compra de nuevos kits, se ha suministrado al SNEM los papeles impregnados para pruebas de susceptibilidad, se ha apoyado al Programa de Aedes en el análisis de la información, capacitación de los recursos humanos en los repartos militares, envío de muestras de sueros al CDC en San Juan, Puerto Rico, adquisición de papeles filtro para realizar encuestas serológicas y supervisión directa de campo con el personal directivo.
6. El Educador para la Salud resumió las actividades de educación a la comunidad y distribuyó parte del nuevo material didáctico.
7. En la exposición de los Consultores de AID se enfatizó sobre aspectos de capacitación, problemas administrativos que inciden en la marcha del programa, el uso racional de insecticidas y que solo deben usarse en casos de emergencia y especialmente en el diseño del programa a base de una estratificación.
8. El Dr. Diez agradeció la participación del personal.