VECTOR BIOLOGY & CONTROL

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CONSULTANT REPORT

DOMINICAN REPUBLIC

ENTOMOLOGICAL ASPECTS OF AN EMERGENCY PLAN FOR CONTAINMENT OF DENGUE HEMORRHAGIC FEVER OUTBREAKS IN DOMINICAN REPUBLIC

by

Robert J. Tonn, Ph.D.

AND

MEDICAL ASPECTS OF AN EMERGENCY PLAN FOR CONTAINMENT OF DENGUE HEMORRHAGIC FEVER OUTBREAKS IN THE DOMINICAN REPUBLIC

by

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SUMMARY:

There is limited awareness of the potential problem of dengue/DHF in the Dominican Republic. Aedes aegypti is present in every major city in great numbers because of the need to store water and irregular garbage-trash collections. The country is highly urbanized and the majority of people live in the densely populated marginal barrios. The major vector control agency, SNEM, does not give Aedes aegypti control priority and does not have the resources to respond to a dengue epidemic.

The National Committee for Control of Dengue Emergencies is just being organized. The consultants wrote a draft of the objectives and duties of the committee and a preliminary contingency plan. Both of these drafts must be revised by the Committee to fit the realities of the local situation as a short-term consultant can not do this.

The Committee's first priority should be to create an awareness of dengue/DHF in the medical community and to critically assess the capacity for diagnosis and treatment of dengue/DHF. Somehow the ability of SNEM to react to the Aedes aegpti situation has to be improved. This may first require changes in the administrative structure or consideration could be given to creating a small rapid response Aedes aegypti control unit outside SNEM. At present SNEM has limited development potential and would require a large financial input, re-evaluation of staff duties, improvement of training and staff supervision, and

improvement of preventive maintenance of equipment. This may be asking too much.

Prevention of Aedes aegypti before an epidemic may be less expensive than emergency control, but the Government may have to assume the entire financial burden for preventive measures. Community participation for labor intensive control measures and sanitary education to reduce Aedes aegypti breeding sites and limit human-mosquito contact would reduce the cost but it still might be beyond the Government budget. Community action will curtailed until water delivery and garbage collection improve and that is not in the near future.

The strategy should be to have a small highly mobile unit that can rapidly control Aedes aegypti in areas surrounding cases. The success of this type of operation would depend upon the time required to identify the case and inform the control unit. More severe local and generalized epidemics would require large scale ground or aerial ULV treatment. Since acquiring large numbers of ground equipment and vehicles may not be practical, the first approach to a wide-spread dengue epidemic might be ULV aerial control. Expertise in this approach is not available in the Dominican Republic and aerial applications of insecticides should not be considered until consultants such as those from CDC-San Juan are available to determine the need for aerial ULV and give technical assistance during the applications.

The Committee will require consultants and other international assistance. The best source of this assistance would be USAID and PAHO. However improvement of obtaining assistance would be better if the Committee was institutionalized and long-term support from SESPAS is demonstrated.

9. Annexes

9.1 Research needs in vector biology and control

9.2 Persons contacted

9.3 Draft entomology section of contingency plan

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ENTOMOLOGICAL ASPECTS OF AN EMERGENCY PLAN FOR CONTAINMENT OF DENGUE HEMORRHAGIC FEVER OUTBREAKS IN DOMINICAN REPUBLIC

by

Robert J. Tonn, Ph.D.

1. INTRODUCTION:

The Vector Biology and Control Project was requested by USAID - DOMINICAN REPUBLIC to prepare an emergency plan to manage dengue/dengue hemorrhagic fever (DHF) epidemics. The objectives of this consultantship were:

1. determine the level of knowledge of the medical community regarding dengue/DHF diagnosis and treatment.

2. determine what public and private medical resources would be available (such as medical supplies, hospital beds and personnel) to handle an outbreak of DHF.

3. determine the availability of vector control resources in the country (both national resources and those provided by donor agencies). Analyze the organizational readiness and technical approach that would be utilized by national institutions such as SNEM and the Dominican Armed Forces in the event of a DHF outbreak.

4. analyze the abilities of the GODR, private organizations and international donor agencies to respond immediately to the financial requirements of combatting a DHF outbreak.

5. based upon the findings obtained in activities (1-4), prepare an emergency plan for managing a dengue/DHF epidemic. The plan should include the following components:

a) Training public and private sector medical personnel in dengue/DHF diagnosis and treatment.

b) A plan for obtaining either on an emergency basis or in advance of a DHF outbreak, the medical resources required to manage the outbreak.

c) A plan for radically reducing the Aedes aegypti mosquito population in the affected region of the country, as soon as an epidemic breaks out.

d) An agreement between the GODR, private organizations and international donor agencies to provide the needed funding to combat a DHF outbreak if it were to occur.

Although originally a single consultant, a physician with experience in diagnosis and treatment of dengue/DHF, was requested, it was later decided to include a medical entomologist to assist in developing a plan for emergency control of Aedes aegypti. As a result the consultantship includes recommendations on research and training associated with the control of Aedes aegypti and suggestions of preventive measures to reduce its populations before an outbreak of DHF.

During the consultantship, meetings of the National Committee for the Emergency Control of dengue/DHF were held and this report provides observations on the committee and its activities including a rapid response emergency vector control program.

Dr. Robert Tonn, medical entomologist, was in the country from 25 May - 16 June and Dr. Stephen Waterman, physician-epidemiologist from 1-21 June 1988.

2. ACTIVITIES UNDERTAKEN

2.1 ENTOMOLOGICAL

A number of CDC and PAHO reports provided background information on Aedes aegypti and dengue in the Dominican Republic. Study areas of the USAID-GODR Proyecto de Control de Vectores (PCV), at Ensanche Espaillat, Gualey, Mejoramiento Social, 30 de Mayo and Manguito were visited to determine breeding habitats and environmental conditions conducive to Aedes aegypti in Santo Domingo. A contingency plan for emergency control of Aedes aegypti prepared by Drs. Jacqueline Medina and Fatima Guerrero was reviewed. Sr. Carlos Peña of PCV and Dr. Marcos Mercedes, Secretary of the National Committee for Emergency Control of Dengue, briefed us on current status of Aedes aegypti distribution and control and served as liaison between us and others involved with dengue/DHF prevention and control.

Ing. D. Gañan, Director of SNEM, pointed out that priority of SNEM was malaria control. At one time SNEM was active in the PAHO Aedes aegypti eradicction project, but at present no funds are designated for Aedes aegypti. SNEM does some surveillance and with the assistance of the PCV does research on control methodology. As a result it is a source of expertise on Aedes aegypti.

SNEM has 4 vehicle-mounted ULV sprayers that are broken. It has about 7-8 portable mistblowers and two portable thermal foggers. The Dominican Armed Forces has another one that is also broken. The PCV has one LECO ULV 500 in Santo Domingo and three more in Santiago, but these are too small for continuous large scale activity. There is a LECO vehicle mounted thermal fogger, and a hand-operated Mini-LECO at SNEM which belongs to PCV. This equipment would be of minor value in case of a wide-spread DHF epidemic, but would help in localized dengue cases.

SNEM has DDT for malaria control but this insecticide is not recommended for Aedes aegypti control. There are about 50 containers (25 kilos each) of Abate 1% SG that could be used for larviciding. Samples should be sent to CDC-Atlanta, Georgia for chemical analysis. There are small quantities of Actellic 50 UBV, malathion ULV, and Sumithion ULV formulations in storage but these should also be analyzed chemically by CDC. It is concluded that SNEM does not have vehicles, application equipment or insecticide to mount an emergency campaign against Aedes aegypti. However, suppliers could ship equipment and insecticide to Santo Domingo in 24 to 72 hours notice from the USA if money were available.

USAID/GODR Proyecto de Control de Vectores

The project has been functioning for about one and a half years and is expected to continue for one and a half or more additional years. It is located at the Pontificia Universidad Católica

Madre y Maestra in Santiago. Technical support is from the University of South Carolina (USC) and logistical support from SNEM. Its major functions are entomological research and training. Facilities and staff are also found in Santo Domingo where most of the work on Aedes aegypti occurs. The SNEM facilities include an office - laboratory equipped with four stereoscopic dissecting microscopes and one compound microscope. There is a small insectary located a few blocks away. Staff included a medical doctor, chief of entomology and five entomological auxiliares from SNEM.

The Project has send Andres Zaglul to USC-Wedge for a master degree. Two more candidates have been accepted for fall 1988. The Project arranged for four SNEM staff to attend USC-Wedge for a short course in advanced taxonomy of mosquitoes and three SNEM and 1 Military staff to attend a epidemiology of malaria and vector control course. It has given locally a two-week course on taxonomy and biology of mosquitoes to 10 participants , training sessions on community participation in vector control to staff from SNEM and universities, two short-courses on the operation, care and maintenance of space spray equipment, a course on operation of an insectary and on-going special training in entomological techniques for the staff seconded from SNEM. Future local courses planned included training physicians to recognize dengue/DHF. Courses will continue on operation of ULV and other space spray equipment and new methodology for vector control. PVC has completed insecticide susceptibility test using adult Aedes aegypti and found them susceptible to malathion. This is a routine activity done

at Santiago but could be done also at SNEM. Larval testing was done in South Carolina, but should be done routinely in Dominican Republic, especially with Abate.

A trial using larvivorus fish was done in Mangueto (Santo Domingo). Community participation evaluations associated with the study were difficult to understand and this study needs to be repeated. Population dynamics of Aedes aegypti, as related to container type, and studies on pupal populations and subsequent adult emergence from these habitats will indicate relative importance of different containers. These and routine monitoring of Aedes aegypti in selective areas of the country are being done to improve entomological surveillance and develop evaluation indicators for control operations. House container and Breteau indeces are reported for larvae. Work production for house scarches is about 15 houses per man per day. Adult collections are made with a sweep net and results expressed as number of aegypti females captured per 10 minutes per man per house. Ovitraps have been tried but it is believed adult counts are a better indication of infestation. Capture rates have been over 100 adult aegypti per house and almost every house infested. The 55 gallon drum is the most important breeding site in the study areas and perhaps for most of the country.

Field insecticide application trials using a LECO thermal fogger, a LECO ULV 500 and aerial ULV with a single-engined fixed winged aircraft have been completed. The ULV ground application at about 6 fl. oz. per minute at a speed of 5 MPH produced only about a 30% reduction of caged and natural mosquito populations

but studies now in progress show more mortality. The aerial application was a failure for non-technical reasons. A small trial with a LECO ULV 500 is currently in progress to relate mortality with parous rates. Arrangements have been made to use the Dominican military heliocopter configured with Simplex 6800 Beecomist application nozzles. Dosage will be 6 fl. oz of malathion ULV formulation per acre. This method will be compared with ground ULV applications. A study using pyrethroid impregnated curtains is also planned (Annex 1, Research and Training).

The PCV has funding and the technical capacity to plan and implement research needed to suggest potential vector control activities for rapid response strategies. Without this type of research to verify procedures any vector control component in a dengue emergency plan of action would be questionable. The Project also has the technical capacity to provide courses and in-service training in vector control to create national expertise for effective emergency control.

Areas visited in Santo Domingo were primarily low-income housing, many without streets. Consequently vehicle-mounted space spraying could not be used. Every one of the areas have continuous severe shortages of piped potable water. Small plastic water pipes were noted but many are illegal and broken; few had taps that functioned. As a result, people go to common water collecting points. Small plastic containers are used for potable water but

many dwellings also had 55 gallon drums or 72 gallon plastic containers for general water storage. Less marginal barrios had cisterns and elevated tanks. Commercial trucks are available to haul water. Dr. Paulino (SNEM) said that officially about 4,000 cisterns are reported for Santo Domingo but his work indicates the number may be much higher, but not too many are positive.

Most marginal barrios have poor garbage/refuse collection. Sites for refuse were noted on the edge of areas not having streets and these were in use. Only barrios, such as Gualey on the bank of Rio Ozama, were cluttered with refuse, especially in the erosion channels running to the river. These are partially flushed during heavy rains. Areas such as Manguito and 30 de Mayo were clean with few breeding habitats other than water storage tanks.

Ensanche Naco, an upper income area, had sealed elevated water tanks, flower pots and other temporary larval habitats. A major problem might be vacant lots as they were usually cluttered with refuse.

Households in the poorer barrios visited did not have mosquito nets and insecticides (aerosols) or mosquito coils were not used. Water tanks had covers, more to keep out debris than to limit mosquito breeding. Many tanks with tightly fitted covers still had breeding.

SNEM has done 3 Aedes aegypti surveys in Santo Domingo, 2 in Santiago and 2 in Puerto Plata. It is preparing to survey Barahona, San Pedro de Macorís, and la Romana. CDC/San Juan laboratory has done surveys for Aedes albopictus and SNEM plans to do spot checks for the mosquito. OPS sends staff into the country to assess the aedes aegypti situation. It is concluded that expertise and a workable strategy exists to continue larval surveys. However, the reporting system should be expanded to include larval and adult indeces (Annex).

Since Aedes aegypti surveillance and control is not of priority, SNEM lacks transportation and per diem to expand surveys to all the cities listed in its 1986 contingency plan for emergency control. Minor supplies such as flashlights, bulbs , batteries, collection tubes, pipettes, and nets are frequently in short supply. Transportation is a serious problem encountered in SNEM, the national virus laboratory and with other institutions visited. SNEM lists 32 vehicles in service but upon my visit over 10 of these were under-repair. Because of the age of many of these, it would be extremely difficult to maintain a rapid response emergency vector control system.

2.2 ORGANIZATIONS CONTACTED

2.2.1 Health Education

CENACES has the capacity for developing educational material

and is working with SNEM on malaria control. This contact should be enlarged to include dengue awareness, Anti-Aedes aegypti promotion and training materials for short-training sessions for schools, private volunteer organizations, health centers, community-based agencies, medical professionals etc.

They do not have equipment for producing video cassettes but the Ministry of Health in Trinidad-Tobago produced a video cassette on dengue - Aedes aegypti by using expertise and equipment from a local television station. This could be considered by CENACES. They do have overhead projectors and slide projectors. CENACES should stockpile examples of brochures, posters, films, slides and video cassettes on dengue, anti Aedes aegypti, and community participation that would be available when needed.

CDC-San Juan laboratory staff when visiting the Dominican Republic should meet with SNEM and CENACES to discuss design of dengue awareness compaigns. WHO/RUD in Geneva Switzerland has general kits on vector control by urban communities. The WHO-Representative could be asked to see if some kits could be sent to SNEM and CENACES.

2.2.2 Community Involvement

CEDOIS has a list of over 150 private non-profit agencies in the country involved in social programs and in 1985 USAID prepared an overview of alternative beneficiary groups for a self-financing health care project. The overview notes over 30 potential beneficiary groups and over 50 organizations were contacted. These and other lists maintained by OPS, SESPAS etc. should be collected by the National Committee for Emergency Control of Dengue. Promising agencies should be contacted and informed about dengue/DHF, community and personal actions such as source reduction, destruction or removal of solid waste, use of Abate etc.

SESPAS has a network of minimally-paid health promoters and SNEM also has malaria promotors. SSID, CARITAS, ASPHC and Acción Evangelica have volunteers working in health. The Civil Defense also has a volunteer network. Training courses should be developed that would create awareness of the potential of a DHF epidemic and sanitary educations on how to reduce mosquito densities or human/mosquito contact.

SESPAS and some private agencies have established village health committees. These apparently have been more successful in rural areas than urban ones. These agencies should be surveyed for functioning health committees in urban barrios. Although the private agencies may be mostly rural or have limited geographical coverage, 38 of the 54 agencies surveyed were headquartered in

Santo Domingo.

A dengue or DHF epidemic may be most severe in low income or marginal barrios. It is estimated that population growth in Santo Domingo is 6.3% and in the marginal barrios 10%. At present about 64% of Santo Domingo residents live in marginal barrios. These are the barrios with poor potable water delivery and solid waste collection. Therefore contact with community based volunteer groups and promotion of community involvement should be a priority function of the National Committee membership dealing with health education and vector control, especially with the present contraints in SNEM.

Approaches to consider are as follows.

1) Source reduction or community beautification campaigns must have outside support to haul refuse, sufficient trucks to cover area, planned routes and collection points for refuse trucks, time frame for the campaign compatible with other activities in the community, and intensive promotion directed towards health and community pride.
   Campaigns should be repeated every 6-8 weeks.

2) Reduction of mosquito breeding in large stored potable water containers. Health education showing breeding in containers and remedies to prevent breeding such as weekly

cleaning of containers, turning them upside-down when not in use, constructing tight fitting covers or tying cloth around their tops, introducing of larvivorous fish or treatment with Abate sand granules.

3) Personal protection such as using mosquito nets for children sleeping during the day, in some areas metal, plastic or even cloth (tulle) screens, pyrithroid impregnated curtains, use of insecticide aerosols, flit guns or mosquito coils; placing bottles, tires and others containers under cover or upside down, regular cleaning of waterers for animals, control of water in flower vases, cementing in tree holes, repair of roof eaves etc.

2.2.3 Dominican Armed Forces

The Dominican Armed Forces have staff trained in environmental health including vector control. They have portable space spraying equipment and one vehicle-mounted ULV unit which needs repair. The military have twin-engined airplanes and heliocopters capable of ULV applications. They lack the spraying equipment and pilots trained to do ULV applications. Heliocopter pilots may receive some training during the 5-15 July 1988 trials planned by PCV. This trial will use equipment on loan from Fort Detrick, Maryland, USA. The Armed Forces have vehicles and human resources for emergency vector controloperations but official request are required for release.

2.2.4 Civil Defense

The Civil Defense has limited capacity for assistance in vector control during an emergency. It lacks the resources needed including vehicles and insecticide application equipment. It functions almost exclusively with volunteers and has a volunteer network in Santo Domingo. Civil Defense is directly under the office of the President of the Republic and has a close working arrangement with SESPAS. It has the collective responsibility to assist in emergencies, such as a DHF epidemic, and maintains international contacts needed for assistants.

2.2.5 SESPAS

Several agencies within SESPAS would be involved during an epidemic. The Epidemiology Division is weak because the director is out of the country for training. However, staff from Epidemiological surveillance was involved in producing the 1986 contingency plan for the emergency control of Aedes aegypti in the Dominican Republic. This Division and SNEM would be involved in surveillance of Dengue and Aedes aegypti. The National Division for Emergencies and Disaster within SESPAS has limited contact with SNEM but there is a vector control component in the national plan. Staff from the Division attended a local PAHO seminar on epidemiology of disasters and vector control was covered. They do not have a stockpile of insecticide or application equipment nor resources to do so. The Division has several plans for various types of

disasters and emergencies but these are not in operation. Other plans are being produced but it is difficult to determine their value. They are better organized to handle medical aspects of a dengue emergency.

SESPAS has a Division of Environmental Health in which vector control is a listed activity, but their statistical report only shows funds used for rodent control.

2.2.6 OPS (PAHO)

Besides USAID this agency is best equipped to respond to dengue epidemics. It provides training, consultants and limited financial support for vector control. It also has the capability of contacting other agencies within the UN system, supply administrative assistance at its headquarters for procurement of insecticides and application equipment. OPS has written a proposal for dengue but no progress was made. It maintainscontact with every aspect of the medical community. Of mayor importance was its library and access to MEDLINE and other computer data basis. The OPS has interest in the National Committèe and like USAID can do much to stimulate activity and provide advise during the beginning stages of the committee's development.

3. VECTOR CONTROL RESOURCES AND ORGANIZATIONAL READINESS

3.1 INTRODUCTION

Drs Medina and Paulino of SNEM have attended PAHO workshops

on contingency planning for Aedes aegypti control for dengue/DHF epidemics. Drs. Medina and Guerrero have prepared a contingency plan for SNEM. Recently the Dominican Republic has created a national committee for emergency control of dengue/DHF and capability for serological diagnosis exists in the National Laboratory of Virology.

The problem is that it is impossible to predict the exact time and place for dengue cases to occur and whether any of these cases will have the signs and symptoms of Dengue hemorrhagic fever or shock syndrome. Cases of dengue are reported but because of limited awareness of doctors of the disease, dengue is under-reported.

Aedes aegypti is known to occur in every major populated area, probably in extremely high densities because of water storage practices and poor solid waste collections. Continued urban expansion, especially in low-income and slum settlements that lack these utilities and services, will contribute to this vector problem. Only through improved potable water supplies and solid waste collections can much progress be made to limit the threat of dengue/DHF. Water shortages are found in all sections of society and it appears that these shortages will increase. Poor sanitary awareness cuts across all socio-economic levels and education to reduce breeding places will have little impact until services become dependable.

A contingency plan should include means to rapidly reduce and maintain low adult Aedes aegypti populations in epidemic areas and to enhence adult control through larviciding and source reduction. There is no foolproof way of doing this. In fact there are very few documented cases that vector control is effective during an epidemic. Technically this should not be the case, but by the time vector control specialists are informed of an epidemic and they can mobilize, it is too late. Nevertheless public reaction usually demands some type of vector control response.

Most emergency vector control methods are sophisticated and expensive. But routine vector control can be labour intensive community oriented and can be utilized in pre-epidemic periods through community involvement. Consequently, to reduce cost and increase effectiveness, a surveillance system based upon epidemiological information and entomological surveys is needed so a rapid response mechanism for vector control can be directed towards areas not yet experiencing cases.

A plan of action for emergency vector control will have a number of limitations. For example, the 1986 SNEM plan required an expenditure of $1,869,535 (Pesos) which is about $4,000,000 (Pesos) now. Insecticides and application equipment including vehicles can not be easily stockpiled and preventive maintenance is poor (all ULV vehicle mounted equipment needs repair at this time). As a result the burden of a DHF emergency will likely fall on the

medical profession and the greatest contribution of vector control will be in areas with limited virus transmission where there is time to implement labour intensive larval control utilizing the community or limited space spraying.

3.2 THE VECTOR SITUATION AND CONTROL RESOURCES

SNEM surveys show Aedes aegypti in every city studied. Outside of a few major cities there is little specific information on its distribution, population densities or breeding habitats. The survey results are similar in the cities surveyed and it might be assumed that the information would hold true throughout the country. (Table 1-5 Help in Planning).

The major resource for surveys and control within SNEM is manpower, but even this is weak. For example using data from the 1981 epidemic in Cuba, a generalized epidemic in the Dominican Republic may require from 3-4000 volunteers and supervisors. Only with considerable in-service training and recruitment of additional staff could SNEM become a viable force in Aedes aegypti control. The Dominican Military Forces, including the National Guard, and the Civil Defense can provide additional manpower for source reduction, larviciding and space-spray adulticiding during an emergency. The Air Force has heliocopters and twin engined fix winged aircraft suitable for ULV application. The Military does not have the application equipment but this could be secured

through loan from the United States of America or stockpiled. Private agricultural spraying companies have single-winged aircraft that with minor changes could treat rural-urban fringes and small cities or with prior government approval even congested urban area. However, pilots would need special training for public health ULV insecticide aplications. Consideration should be given to use technical expertise from CDC-San Juan for aerial operations.

Space spraying ground vehicle and portable equipment is used in agriculture and by certain tourist hotels. Since representatives from tourism and agriculture will be resource contacts of the National Committee, they should have the responsibility of maintaining a current inventory of equipment and public health insecticides, especially malathion, fenitrothion, actellic and pyrethroids. During the 1977 dengue epidemic in Jamaica, PAHO was instrumental in arranging loans of space spraying equipment and insecticides. Recently companies such as TIFA International have volunteered to loan equipment to countries experiencing vector borne disease epidemics. PAHO is the focal point for this type of activity.

3.3 ORGANIZATIONAL READINESS

It is concluded that organizational readiness in vector control is poor and will remain so until research and training can provide expertise and SNEM can produce leadership for supervision and staff to manage a surveillance system and subsequent vector control activities. At present malaria staff also function in aeypti control with no one person having authority or responsibility

to react to dengue related problems. The PCV should remain the focal point for research and training.

There is adequate representation of vector control specialists in the National Committee but duties must be clearly delineated. A major contribution could be a long term reduction of breeding sites through community action. SNEM staff have had experience in health education and Aedes aegypti education materials could be stockpiled and evaluated.

Organizational readiness will depend upon the long-term success of the National Committee and the chains of communication it produces. Some thought could be given to simulated epidemic exercises similar to those used in natural disaster training by civil defense organizations and using CDC-San Juan staff as external evaluators during initial simulated exercises.

3.4 DEVELOPMENT OF A TECHNICAL APPROACH.

The technical approach will depend upon the number, distribution and severity of dengue cases, presence of DHF, results of research to determine the most effective actions, resources and commitment of people and government. The development of a surveillance system based on epidemiological, clinical, laboratory and entomological data should have priority. This system should be managed by the National Committee and the flow of information must be as

current as possible. Wide scale reports of DHF elsewhere in the Caribbean should be an important factor in deciding control approaches. Consequently the Secretary of the Committee should maintain close contact with the CDC-San Juan laboratory and with PAHO-CAREC. The serological facilities should have the staff, equipment, and reagents to keep current with their work, ie results out of the laboratory in one week or less. The laboratory should be linked with a system of hospitals located primarily in Santo Domingo and the southern part of the island where dengue transmission at present is greatest. This sentinel system eventually should be expanded to provide country-wide coverage.

Entomological information should be based upon larval and adult Aedes aegypti surveys reported by urban barrio or predetermined sectors of a city. SNEM has already collected information from sectors in Santo Domingo, Santiago, Puerto Plata and is planning on similar surveys in San Pedro, Barahona, La Romana and possibly Janima. They have street maps of cities and determine sectors after examination of the city. Two areas from each sector are selected after spot visits. The areas are representative of housing in the sector but should have conditions conducive to Aedes aegypti breeding. One hundred houses in each area are examined for larva and 25 of the same 100 houses are searched for adult mosquitos. One area can be checked per day by the SNEM team. Indeces include house, container and breteau for larvae and number of adults collected per house (unit of time) for adults.

It can be argued that the majority of the houses are either positive for larva or adults or both and there is little need for continued surveys. However, the exercise produces information on housing types, kinds of breeding sites, maps as well as a means of providing some level of sanitary education. Furthermore, it maintains a source of expertise and data basic for planning equipment and insecticide needs. Control approach and identification of entomological risk areas. These risk areas might include the following conditions: majority of houses without a potable water system with at least 1 large drum or tank per 5 houses, limited or irregular collections of solid waste, few or no connecting roads, known high densities of Aedes aegypti, or areas where effective epidemiological sentinels are located and have demonstrated recent virus activity.

Besides entomological data from SNEM, the PCV should continue collecting data such as adult parous rates, adult output by container type and adult house densities which can be used to make evaluations of control tactics and might be of value in determining entomological indicators in epidemiological surveillance.

Routine WHO insecticide susceptibility tests using Abate for larvae and malathion for adults should be done twice a year on Aedes aegypti populations from major cities. Screening of susceptibility to other insecticides commonly used for Aedes aegypti control should be done annually on Santo Domingo mosquitos. When

an indication of resistance to malathion or abate is noted, susceptibility tests should be made quarterly and pilot insecticide studies to determine control efficacy of potential replacement insecticides should begin by SNEM or PCV.

Aedes aegypti control during a dengue epidemic is based on rapid killing of parous females and maintaining low numbers of parous females until virus circulation in the human population stops. Because SNEM does not have vehicle mounted ULV equipment, the method of choice for an epidemic will probably be aerial ULV application of insecticides. However, all available ground and portable space spraying equipment (agriculture, tourism, military etc.) should be mobilized. The PCV should do research to determine time, frequency of application, dosage rates and evaluation methods as soon as posible. There are recommended procedures to follow but these may vary with different climatic, topographic, housing, vector population and other conditions so pilot studies are needed to incorporate effective methodologies in the plan of action.

Epidemiological findings, such as prevalence, incidence and distribution of dengue cases and presence of DHF, will influence vector control strategy in sectors of urban areas. Whenever possible preventive measures applied by the communities should be used both in areas where dengue transmission is occurring and in areas infested with Aedes aegypti but without dengue transmission. This procedure is labor intensive but will reduce

costly emergency control and may make emergency control more effective. This approach requires entomological and socio-economic evaluation as well as intensive sanitary education and coordination. Community and private voluntary organizations active in risk areas should be identified immediately and informed of potential community based actions.

Dengue is endemic but is not a reportable disease nor is it considered a serious problem by the people or medical profession in the Dominican Republic. This situation would change with cases of DHF, but until it does it will be difficult to produce and maintain interest in preventing dengue. A number of organizations are active at the community level that could be involved in sanitary education, solid waste reduction, breeding source management and creating awareness of dengue. SNEM has individuals trained in health education. SNEM and CENACES should be given the responsibility to do research on educational procedures to involve a community in mosquito control. They should also stockpile educational material (video cassettes, posters, films etc.) on community vector control methods. This material could be pre-tested before general use. It should be noted that different materials and methods might be more effective in different age, education, and economic groups. The educational approach must be compatible with the entomological/environmental situation.

The Dominican Republic has a number of service organizations,

private volunteer organizations and other groups interested in promoting community development. Some of these already have health related projects such as general environmental health, solid waste reduction, child health, etc. Others, although without emphasis on health, have community information structures that could be used to create awareness of dengue, need for medical contact and community actions that could reduce vector populations. Contacts should be made with the association of Clubs of the National District, Centro Organización de Interes Social (CEDOIS), Mujeres en Desarrollo Dominicana (MUDE), etc. CEDOIS has a directory of clubs active in Santo Domingo.(See table 6 for information).

As emphasized an effective plan for vector control can only be developed through research. Three research categories must be included to create an effective and cost-efficient rapid response emergency vector control plan. One is to identify entomological indicators that can be used to monitor Aedes aegypti populations and serve as a basis for control evaluations. Another is to monitor insecticide susceptibility and determine effectiveness of insecticides. The last is to select and evaluate application equipment and strategy to control Aedes aegypti under the various conditions found in the Dominican Republic and to measure the effect of components of the strategy so that an integrated control approach can be developed to reduce mosquito breeding during non-epidemic periods as well as control during emergencies.

Various types of training programs will be required to develop rapid response emergency control. One facit will be to create an awareness in the medical community of dengue, (including treatment and prevention). This training should include some vector control especially on individual and community action. "Dengue hemorrhagic fever: diagnosis, treatment and control" published by WHO presents sufficient material on vector control for the part of a course or seminar. Courses have already been given on community involvement in vector control to university trainers and SNEM staff. These courses should be evaluated, possibly revised and continued similar short-courses should be developed for comunity-based organizations, as well as ones to plan and implement solid waste campaigns. PAHO has sponsored this type of workshop in the Caribbean (especially Antigua and St. Lucia). A teacher seminar should be developed to assist teachers in using vector control biology and control in science projects and to inform children on personal measures effective in reducing contact with Aedes aegypti.

A core of trained individuals should be developed in SNEM. Staff seconded to the PCV are already trained. A few auxiliary entomologists are trained in the Epidemiology Section. Both Dr. Medina and Paulino have attended OPS workshops for developing vector control contingency plans. Consequently the expertise is available and they should be encouraged to form a subgroup within the National Committee to develop vector control training modules,

health education materials, and awareness promotion.

OPS, USPHS-CDC, and the PCV provide local short courses and long-term training in epidemiology and vector biology and control is available at the University of South Carolina - Wedge. The USAID-VBC project in Washington has the expertise to design and provide specialized local courses related to dengue and vector control.

3.5 FACTORS TO CONSIDER IN CONTINGENCY PLANNING

The Dominican Republic already has a "Plan de Contingencia para el Control de Aedes Aegypti en Situaciones de Emergencia en Republica Dominicana" produced by Doctors Jacqueline Medina and Fatima Guerrero, 17 October 1986. An earlier plan was outlined during a workshop in Panama in April 1983 and elaborated by SNEM in November 1984.

Both plans follow the outlines recommended in various PAHO workshops and contain a list of actions for the preparatory phase, the alert phase, and the emergency phase. It was noted that financial restrictions placed constraints in implementing the first plan and apparently the same fate occurred with the second one.

The National Committee for Dengue/DHF exists, but there was an earlier committee resulting from the plans written for the Dominican Republic with PAHO assistance. In addition there is a Disaster committee and an inter-agency health committee that could

deal in part with dengue/DHF emergencies. Consequently it is essential that clearly defined objectives and duties by developed for the present committee, that a mechanism be found to liaison with existing committees that might be of assistance in dengue/DHF emergencies, and that SESPAS officially make the committee a long-term activity that only can be dissolved by the Secretary of Health.

Since the Government is undergoing decentralization through the creation of 8 regions with regional hospitals, subcenter of health and a network of health promotors, changes in the National Committee structure might have to be considered as the process develops. SNEM as an agency may change with decentralization and any changes must be studied by the Committee.

Lists of potential members of the National Committee to Control Dengue Emergencies indicate that there is a need to appoint technical and political representation to the Committee and to make it a rather large group. Since active pre-epidemic and epidemic involvement is primarily epidemiological surveillance in hospital and clinics, laboratory confirmation of cases and vector control, these disciplines should dominate the committee. Each discipline may have specific subdisciplines in which contact should be maintained. Perhaps informal subcommittees could be established for this. For example vector control might have one or two representatives on the National Commitee and these representatives could maintain contact with agriculture, private aerial spraying companies, Dominican Air Force, hotel association, health educators, volunteer

organizations, pest control operator, etc. that could provide technical assistance during an emergency. Since the Disaster Committee did some post disaster work on Aedes aegypti following hurricane Emily, SNEM should continue to maintain contact with them.

There is an IDB loan to strengthen health services, primarily in rural clinics, but there is a small component to develop public information about major health problems. Since DHF fits in this category and since physicians are under-diagnosing dengue, use of this or similar funds to create an awareness of dengue might be justified. It was noted that at the first meeting of the National Committee, the health education unit and the epidemiology direction were not represented. This should be corrected.

Contingency plans deal with pre-epidemic planning and surveillance as well as emergency action. However entomologically, preventive measures to reduce Aedes aegypti populations should be continuous. Since Aedes aegypti breeding sites are largely man-made, sanitary education directed towards reduction of breeding sites and personal and community-based activities should be on-going. The national policy on potable water is to increase availability of water through creation of resservoirs and other sources and by organization of the system to reduce waste and eliminate illegal connections. The National committee should encourage promotion of this policy. It might also consider joining other health activities such as control of urban schistosomiasis, which is linked to potable water waste.

Apparently in many parts of the Caribbean, there has been increased use of larvivorous fish in portable water storage containers. Rearing and distribution points of fish could be attempted by volunteer organizations. DHF is an important health problem in a number of countries of South East Asia and the Western Pacific. Singapore has developed source reduction through legal measures in which fines help support the health education campaign. The legislation is aimed at existing breeding sites and the creation of new breeding sites. As a result of their success, other countries have a "Destruction of Disease Bearing Insect Act". This type of act could be established during an epidemic and enforcement could be encouraged to continue after the epidemic.

Most vector control operations during an emergency fail because of delays in declaring an emergency, logistics, and implementation of space spraying. Nevertheless some countries in Asia do thermal or ULV applications of a 100 meter radious of recent identified cases of dengue. The results have been equivocal. Greater success was noted by treating a larger area around cases with two ULV applications plus abate larviciding three times in one year. This was considerably more expensive but could be studied experimently by SNEM.

The 1981 dengue epidemic in Cuba cost the Government over 30 million US dollars for mosquito control activities alone. Field workers at regional levels were 9576. There was 3961 portable ULV machines and 215 vehicle-mounted ULV machines.(24).

machines. Yet 344,203 cases of dengue were reported, 116,143 persons were hospitalized and there were 158 deaths (12). Any plan of action should consider the above in light of the present situation in the Dominican Republic. The question must be asked how much can be spent on preventive mosquito control measures against other health priorities and is it worth it under the present conditions of SNEM. The capacity of SESPAS to handle persons hospitalized with dengue and to implement emergency vector control measures is poor. Action even with a functioning National Committee to Control Dengue Epidemics is likely to be slow. Therefore, the National Committee must be institutionalized and considerations made at the highest level how to react to appearance of DHF within the country.

One approach for vector control would be to create a rapid response emergency vector control unit similar to what has been purposed in Puerto Rico. The need for such a unit is of greater importance in the Dominican Republic than in Puerto Rico, because SNEM does not have the equipment and insecticides available in Puerto Rico. Cost for 4 vehicle-mounted ULV generators and 10 portable ULV machines would be US$35,000 or more. 5 or 6 Pick-up trucks in excellent condition would be required by the unit. At least 200 gallons of ULV formulation should be ordered and future stockpiling would depend upon average monthly use. This amount would be in addition to the amount SNEM normally has on hand. Staff out include one professional, one supervisor for the 10 portable ULV machines, 20 spray operators for the machines and 4 driver operators for the vehicle-mounted equipment. Overtime,

per diem, vehicle and equipment operating and maintenance expenses would have to be budgeted.

Restrictions besides cost of the unit include the following: 1) lack of supervision and discipline at SNEM, 2) lack of preventive maintenance at SNEM even after several training courses, 3) lack of maps, control planning and evaluation procedures, 4) tendency to use equipment for other than emergency measures, 5) SNEM does not give Aedes aegypti control priority, 6) general state of inability to follow through observed and 7) lack of commitment to prevention of dengue. Some of these restrictions could be satisfied by creating the unit outside of SNEM, i.e. under direct administration of Secretary of the National Committee with the Committee having the additional function of evaluating the unit.

If a rapid response emergency vector control unit is created consultants from CDC-San Juan Laboratory or MRCU - Grand Cayman should be requested for planning of the unit and to train and evaluate the staff.

4. CONCLUSIONS

At present the Dominican Republic does not have the capacity to react rapidly to control Aedes aegypti nor will it have this capacity in the near future. Training of present SNEM staff and minor purchases of equipment will have little effect until staff supervision and motivation causes a change in work pattern.

A contingency plan for vector control should not be developed without research. The PCV has funds and research needed to improve control methodology. However until research results are available, control procedures should follow general CDC-San Juan and OPS recommendations on emergency vector control.

The greatest resource in Dominican Republic is people and the number of volunteer groups. Dengue awareness and community-personal protective measures against Aedes aegypti is low, but interest exists to harness this resource. Health educational material should be developed, pretested and stockpiled or put into immediate use. For vector control the community could become active in source reduction and treatment (biologically or chemically) of larva.

Space spraying is the method of choice for rapid reduction of adult Aedes aegypti. Since equipment and insecticide is not available, aerial ULV will undoubtedly be considered for general epidemic situations and probably some local ones. Aerial ULV applications should not be considered without technical expertise which is not now available. CDC-San Juan will have to be involved in assisting technical decisions to be made on when, where and how to space spray and will have to participate technically during the actual insecticide application.

5. RECOMMENDATIONS

1) Consideration should be given to improving the ability of SNEM to respond to emergency vector control situation or creation of a separate rapid response vector control unit.

2) All SNEM field officers should have at least one person trained in anti-Aedes aegypti measures and methods of organization of community involvement in Vector control.

3) Support should be given to the PCV for research toward effective emergency vector control strategy and for training on organization readiness in SNEM.

4) The National Committee should coordinate training, encourage production of training modules for dengue emergencies and stockpile available education material for OPS, CDC and other sources.

5) Private volunteer organizations, civic clubs and community-based agencies should become involved in dengue-awareness programs and training on source reduction and other community actions.

6) CDC-San Juan should be involved in assessing the contingency plan, evaluation of simulated emergency exercises, and managing ULV aerial applications during initial emergency situations. Other consultants could be used for specific assignments.

7) Consideration must be given to establishing channels of international financial assistance not only during an epidemic but to provide preventive measures before potential epidemic risks.

6. BIBLIOGRAPHY.

The National Committee for Emergency Control of dengue/DHF should maintain a reference library or have a list of essential publications and documents on dengue and Aedes aegypti control available from the OPS library. OPS has computer access to MEDLINE and OPS reference libraries. All committee members should receive the Dengue Surveillance Summary edited by San Juan Laboratories, G.P.O. Box 4532, San Juan, Puerto Rico. Suggested references are as follows:

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7. ACKNOWLEDGEMENT

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8. TABLES

TABLE I

RESUMEN DE PERSONAL DEL SNEM

	1988		1989		1990	
	SNEM	SS	SNEM	SS	SNEM	SS
Administracion y Otros						
a) Administradores	1	0				
b) Auxiliares	1	0				
c) Contadores	2	0				
d) Oficiales de Pago	0	0				
e) Encargados de Almacén	1	0				
f) Auxiliares de Almacén	2	0				
g) Secretarias	1	0				
Total Personal Adm.	8	0				
Transporte						
a) Mecánicos y auxiliares	16	2				
b) Choferes	17	4				
c) Operadores de embarcaciones						
Total Transporte	33	6				
Operaciones de Rociado						
a) Ingenieros	1	0				
b) Sanitarios o Jefes de rociado	1	0				
c) Jefes de Sector	25	0				
d) Jefes de Brigada	5	0				
e) Rociadores	28	18				
Total Personal Operaciones	60	18				
Operaciones de epidemiología						
a) Medico	1	0				
b) Entomólogos	0	0				
c) auxiliares de entomología	6	0				
d) Estadisticos y Auxiliares	3	1				
e) Evaluadores	160	20				
f) Microscopistas y personal de laboratorio	34	4				
Total Personal	204	25				
TOTAL PERSONAL SNEM	305	49				

TABLE 2 AEDES AEGYPTI BREEDING BY CONTAINER TYPE

	CITY					
	Distrito Nacional		Santiago		Puerto Plata	
TYPE OF HABITAT **	TOTAL/+	(%)	TOTAL/+	(%)	TOTAL/+	(%)
Depósitos de Barro			371/86	23.2	67/7	10.4
Barriles, toneles etc.	2871/1475	51.4	2115/713	33.7	174/65	37.4
Depósitos diversos	2147/667	31.1	2707/535	19.8	211/71	33.4
Gomas	460/235	51.1	210/22	10.5	367/129	35.1
Total	5967/2387	40.0	5648/1356	24.0	838/278	33.1

* based on surveys conducted by SNEM

** other habitats surveyed include tanques elevados, tanques, bajos, canaletas, arboles, y plantas surgentes. Pozos aljibes and otros.

TABLE 3

AEDES AEGYPTI SURVEILLANCE SUMMARY

DATE_____

CITY	BARRIO SECTOR	INDECES			
		HOUSE	CONTAINER	BREATEAU	ADULT

TABLE 4

FIELD EVALUATIONS - DAILY COVER ESTIMATES

	SPACE SPRAYING METHOD	HECTARES[2]	HOUSES
1.	C-47 (DC-3) or large heliocopter	6,000	
2.	Light aircraft or small heliocopter	2,000	
3.	Vehicle mounted cold aerosol (e.g. leco)	125-225	1,000-1,250 *
4.	Vehicle mounted thermal fogger	150	
5.	Back pack mist-blower	5-30	60-80
6.	Hand - carried thermal fogger	5	
7.	Source reduction- temephos SG**		18-20

* ULV coverage also reported by city block at 70-80 in Cuba

** Larval control

TABLE 5

AEDES AEGYPTI OPERATIONAL PLANNING

DATE:_____

CITY-SECTOR	POPULATION	HECTARES SQ.	MANZANAS	CASAS
SANTO DOMINGO				
SECTOR 1				
2				
3				
4				
5				
6				
7				
8				
9				
10				
11				
12				
13				
14				
15				
16				
17				
SANTIAGO				
SECTOR 1				
2				
3				
4				
5				
6				
7				
8				
9				
10				
11				
12				
PUERTO PLATA				
SECTOR 1				
2				
3				
4				

TABLE 6

PRELIMINARY LIST OF PRIVATE BENEFICIAL -COMMUNITY AGENCIES

	Rural Urban	Env. Hlth.	Hlth Educat.	Clinics	Promoter
ACCION EVANGELICA	U				*
ACCION SOCIAL DE PROMOCION HUMANA CAMPESINA--ASPHC			*		
PROFAMILIA				*	
CARITAS		*		*	
CEFASE		*	*		
CEDOIS	U				
ENDA CARIBE	U	*		*	
FUDECO	R-U	*			
IDDC	U	*			
MERCEDARIAS DE LA CARIDAD	U			*	
MISION METODISTA LIBRE	U	*		*	
PEACE CORP.	U-R				
PROGRAMA DE SALUD BUCAL DE UCMM	U-R				
PROSAFA	U-R	*	*	*	*
RADIO POPULAR	U-R		*	*	
SSID	R		*		*
SOCIEDAD ALEMANA DE COOPERACION TECNICA -GTZ	U	*	*	*	
SOCIEDAD MEDICA CRISTIANA	R			*	
UNICEF	U				*
UNIVERSIDAD CENTRAL DEL ESTE -UCE	U			*	
UNIVERSIDAD NACIONAL PEDRO HENRIQUEZ UREÑA - UNPHU	R	*	*	*	*

9. ANNEXES

ANNEX 1. RESEARCH NEEDS IN VECTOR BIOLOGY AND CONTROL

The USAID/GODR Proyecto de Control de Vectores has expertise and resources to plan and implement vector research. The PCV has been involved in community participation and health education research linked to vectors. The PCV developed similar research in Guayaquil, Ecuador, and the report of Dr. P. O' Conner should be made available to investigators in the Dominican Republic. The following outlines are suggested research needs.

1. Identify Space Spraying Strategy for Emergency Vector Control

1.1 Objectives and Methodology.

A. To determine the individual and combined roles of portable vehicle-mounted ground and aerial ULV equipment in rapid reduction of Aedes aegypti.

1. The relative value of each type of equipment to reduce the Aedes aegypti population under different environmental/ housing conditions and to maintain low densities.

2. Measure the combined effect of the equipment utilized in the same study areas. If possible also in combination with larviciding, health education and source reduction.

3. Analyze the cost-effectiveness in reducing adult mosquito population of each equipment type.

B. To determine effectiveness of malathion ULV formulation and its acceptance by the community. If funds available compare with other public health ULV formulation insecticides.

1. Determine and maintain susceptibility status of local Aedes aegypti populations to malathion.

2. Measure mortality of Aedes aegypti adult populations through net-sweep collections, reductions of ovitrap positivity and changes in parous rates in field collections.

3. Question individuals in treated areas on mortality of non-target organisms and opinion of control.

C. To establish an application schedule to maintain low densities of parous Aedes aegypti females to interrupt virus transmission in human population.

1. Adult mosquito control of 90% reduction of Aedes aegypti parous females in 1-2 application.

2. Recovery time interval from 90% reduction to 70%. Measure in days to recover.

3. Retreatment when populations has recovered to 70% of original density. Determine time interval between retreatments.

4. Costing of operation

4. Continued

- determine number of houses, blocks or hectares per equipment unit per time unit (usually 1 day).
- determine insecticide used per equipment unit per time unit.
- determine associated costs
- determine labor costs

2. The Role of Pyrethroid Impregnated Curtains to Control Aedes aegypti.

2.1 Objectives and Methodology.

A. To determine the efficacy and cost-effectiveness of pyrethroid impregnated curtains.

1. Impregnate curtains with synthetic pyrethroids such as deltamethrin using same procedure as used for mosquito nets.
2. Determine reduction in adult Aedes aegypti densities through net sweeps in house.
3. Determine time period of reduction and retreatment schedules.
4. Determine possible detrimental effect of pyrethroid or curtains.

ANNEX 2: PERSONS CONTACTED

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USAID - PROYECTO DE CONTROL DE VECTORES

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Members of the National Committee for Control of Dengue Emergencies

CONSULTANT REPORT

MEDICAL ASPECTS OF AN EMERGENCY PLAN FOR CONTAINMENT OF DENGUE HEMORRHAGIC FEVER OUTBREAKS IN THE DOMINICAN REPUBLIC

by

Stephen Waterman, M.D., M.P.H.

SUMMARY:

The objectives of this consultantship were to assess the preparedness of the medical community in the Dominican Republic (DR) to respond to dengue or dengue hemorrhagic fever (DHF) outbreaks and to assist in formulating an emergency plan to minimize morbidity and contain the outbreak. The consultant met with physicians on the National Dengue Committee and other governmental representatives as well as PAHO and CDC officials. Time did not permit much contact with private sector physicians and volunteer organizations.

The National Virus Laboratory has begun a surveillance program which can successfully monitor dengue transmission in Santo Domingo and can potentially provide early warning of an impending epidemic. At present, the general Dominican medical community lacks awareness of dengue and DHF and its risks in the DR. Personnel resources are probably adequate to provide medical care in the event of an epidemic; but appropriate care depends on developing a training program on the diagnosis and treatment of DHF. Public and private hospital beds in the DR which number 11-12,000 are probably insufficient for hospitalizations in a moderate to large outbreak. Laboratory supplies in hospitals meet minimum requirements to manage DHF patients. However, many outpatient facilities lack equipment to perform hematocrits, an essential patient monitoring test. Intravenous fluids for treatment are relatively easily obtained in the DR, while adequate blood supplies for an epidemic will depend on increased

donations.

Santo Domingo is at very high risk for an epidemic of dengue and/or DHF with high mosquito populations, human density and 3 circulating dengue virus serotypes. An epidemic of DHF could result in significant mortality unless the National Dengue Committee implements a training program of physicians and health professionals in the near future and organizes a hospitalization plan. The cost of a massive DHF epidemic similar to that of Cuba in 1981 (over 100,000 persons hospitalized) will probably reach 10's of millions of U.S. dollars. International assistance will be required to control the epidemic and to cope with the economic burden. More emphasis should be placed upon prevention of dengue epidemics through ongoing integrated vector control efforts emphasizing community-based source reduction.

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TABLE OF CONTENTS

1.0 INTRODUCTION

The principle objective of this consultantship was to prepare an emergency plan on the medical aspects of a response to a DHF epidemic in the DR. The work scope entailed: 1) establish a working relationship with a committee of physicians in the DR, 2) assess the capability of the medical community to diagnose and treat dengue and DHF, 3) prepare an inventory of medical resources to address a possible outbreak (supplies, facilities, personnel), 4) assess the capabilities of the Dominican government, the private sector, and other international agencies to respond to the financial burden of controlling a dengue outbreak, and 5) assist in drawing up an emergency plan addressing training of personnel, mobilization of resources, and reduction of vector mosquito populations.

The vector control situation in the DR and recommendations are presented in a separate report prepared by Dr. Robert Tonn. A draft contingency plan addressing both the medical and vector control issues has been prepared in Spanish and English. This report will discuss my activities while in the DR and San Juan, Puerto Rico, and attempt to give additional perspective on the contingency plan and the National Dengue Committee. I will refer to details in Dr. Tonn's report and the emergency plan to avoid undue repetition.

2. ACTIVITIES

2.1 MEDICAL MEETINGS

I met with all but one of the physician clinicians on the National Committee (Annex 1). I was unable to meet with Dr. Jose Manuel Checo, Medical Director of Padre Billini Hospital, an older 160 bed facility in central Santo Domingo. Neither did I meet with a representative of the private medical clinics; such a representative has not yet attended a committee meeting but will be invited. In meetings with clinicians, I asked about level of knowledge regarding dengue and DHF, and details of the hospital system and resources.

All the physicians felt that the level of awareness of dengue and DHF among the Dominican medical community was low. Almost nothing is presented to medical students on dengue in the curriculum; and apparently, most practicing physicians who have heard of dengue think that the disease is now longer present in the DR. These impressions are reinforced by a questionnaire survey by Dr. Jesus Feris and Dr. Marcos Mercedes to 108 physicians earlier this year. When asked to give the diagnostic possibilities after reading a DHF case description, only 2 physicians (1.9%) identified DHF as the first diagnosis, and only 9 others (8.7%) mentioned DHF as a diagnostic possibility. Thus, 89.4% of the physicians did not consider DHF in the differential diagnosis of this case.

The physicians most informed on DHF in the DR are probably Dr. Jesus Feris and Dr. Hugo Mendoza, both faculty at Robert Reid Cabral Hospital and both of whom attended the International Seminar on DHF in the Americas in San Juan, Puerto Rico in June, 1985. Dr. Mendoza has published 2 articles on dengue and is the head of Centro Nacional de Investigaciones en Salud Materno Infantil (CENISMI) which recently put out a report on tropical diseases in the DR including dengue.

Dr. Mercedes has spoken about DHF to physicians at 2 hospitals where surveillance bloods are taken. Dr. Feris has started to work on incorporating material on dengue in the medical school where he teaches. A training plan was put together last year by the SESPAS Department of Epidemiology and SNEM but planned sessions have apparently not gone forward, perhaps for budgetary reasons.

2.2 MEETINGS WITH THE NATIONAL VIRUS LABORATORY AND THE DEPARTMENT OF EPIDEMIOLOGY ON DENGUE SURVEILLANCE

I will review the status of surveillance efforts because the emergency plan depends so heavily on timely and accurate surveillance. AID and SESPAS have standing agreements on enhancement of dengue surveillance through Health Management Systems Project grants, etc., and progress has been made, especially by the National Virus Laboratory. Dr. Marcos Mercedes, assigned by the National Director of Health to dengue surveillance and to act as the Secretary of the National Dengue committee, has been drawing blood samples from febrile

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outpatients at 3 Santo Domingo hospitals for serologic surveillance (contingency plan, p. 12). Plans exist to implement soon serologic surveillance at 2 additional hospitals, Moscoso Puello and Padre Billini. Dr. Mercedes will clearly need additional help to accomplish this expanded activity.

Dr. Ellen Koenig, Laboratory Director, indicates that routine processing of these specimens is going well. Virus isolation will be done as soon as a reverse osmosis water purification system is installed and liquid nitrogen is purchased. There have been occasional delays and hitches, however. During our stay the lab lacked antigen and substrate to test an important sample from a suspect DHF case. Such administrative problems need to be solved so that specimens can be tested promptly. Dr. Koenig is extremely busy because, among other things, of her responsibilities regarding AIDS. An administrative assistant would, perhaps, be helpful in the Virus Laboratory.

The Department of Epidemiology within SESPAS had previously written a plan for dengue surveillance similar to the one outlined in the contingency plan, a plan modeled after that of Puerto Rico. To my knowledge, the SESPAS plan has not been implemented, other tha the work of Dr. Mercedes. This failure to implement a complete program of surveillance is probably due to recent turnover in the Department of Epidemiology. A new director has been appointed in the past year, Dr. Carmen Rodriguez. She was in Costa Rica receiving training of an unspecified nature during my stay in the DR and will return in August. I was able to meet with the acting Epidemiologist, Dr. Rosario Valdez Duvall, who is also newly assigned to the Department. The only holdover is Dr. Fatima Guerrero who has worked on the dengue committee in the past and was on vacation in June. Dr. Guerrero is editor of a monthly epidemiologic bulletin which should include information on dengue in future issues.

SESPAS has central and regional epidemiologists. Case reports of infectious diseases on standard forms are mailed weekly to Santo Domingo. Dominican epidemiologists make extensive use of the telephone for reporting diseases of urgency. At present dengue and DHF are not formally reportable in the DR. They should be. The active participation of the Department of Epidemiology is key to dengue surveillance and the National Dengue Committee.

2.3 HEALTH EDUCATION

Health Education, formerly CENASES, has a staff of 70 who can put together materials including slide presentations and present these materials at the community level. Health educators in SESPAS work closely with health promoters and community volunteers. They should also liaison with private volunteer organizations. The Health Education staff has experience working with dengue materials some of which were provided by CDC and participated in research in this area in collaboration with Dr. Andrew Gordon from the University of South Carolina. CDC is also conducting a variety of projects on health education one of which focuses on schoolchildren and another on including episodes on dengue in a television soap opera or "novela." Health education should consult with CDC on these approaches. Please also see Dr. Tonn's comments in his trip report. Both source reduction and disease issues should be stressed in health education programs.

2.4 NATIONAL DIRECTION OF EMERGENCIES AND DISEASTERS, CIVIL DEFENSE, AND MR. ELLERT-BECK, USAID DISASTER COORDINATOR

USAID has prepared a disaster plan and protocol for the DR but not much has been done with it. Dr. Carmelo Fernandez confirmed that the Dominican disaster plan with respect to hospitals is in an embryonic stage. Only 2 hospitals, Moscoso Puello and Dr. Dario Contreras have begun to implement a working plan. Emergencies and Disasters has apparently prepared lists of sites for field hospitals in major cities. Copies of these lists are apparently available but I was unable to obtain them during

my stay. Both Civil Defense and Emergencies and Disasters indicate that resources such as beds, vehicles, and medical supplies are not available in the country. Please see Dr. Tonn's comments on these agencies.

2.5 CDC, SAN JUAN, PUERTO RICO

I met with staff of San Juan Laboratories including the Director, Dr. Duane Gubler, on June 20 to discuss aspects of the contingency plan draft.

CDC and the Puerto Rico Health Department have established a model dengue surveillance program and are in the midst of developing a system of integrated rapid response vector control. In addition, extensive community health education materials for use in schools and community organizations are available. CDC staff have spent considerable time in the DR as AID consultants on dengue surveillance and as consultants with PAHO and the Rockefeller Foundation on Aedes albopictus surveillance and Aedes aegypti control. Dominican laboratorians, epidemiologists, and physicians have spent varying amounts of time in San Juan.

Dr. Gubler basically concurs with the surveillance criteria for declaration of a health emergency as presented in the first draft of the contingency plan. He suggests that the criteria could perhaps be made less stringent and that concerted emergency vector control response could be initiated at an earlier stage without the hoopla of an official ministerial

emergency declaration. The reason for lowering the criteria is that the opportunity to prevent an epidemic usually has passed by the time intense transmission and an emergency actually exist. On the other hand, since sporadic DHF has probably been present in the DR for some time despite lack of documentation, he recommends raising the emergency criteria for number of DHF cases.

Dr. Gubler also expressed reservations about the notion of insecticide spraying a radius of 100 meters around houses with dengue cases. Although this is still WHO policy, the time lag in even a good surveillance system is usually such that such a response is too little, too late. Dr. Gubler thus recommends more extensive helicopter spraying even with moderate dengue transmission.

CDC has developed Spanish training materials for physicians on DHF including a video tape and is coordinating an emergency hospitalization plan in Puerto Rico. Dr. Miguel Seda is in charge of this project. He has arranged to distribute a poster on medical work-up and referral of DHF patients to emergency rooms and outpatient centers. A survey of private hospital occupancy rates/available beds is underway.

CDC is quite willing to continue consulting and advising the National Committee on dengue surveillance, medical training, vector control operations and health education.

3.0 MEDICAL RESOURCES TO ADDRESS A DHF OUTBREAK

3.1 REQUIRED RESOURCES

The medical resources to address treatment of patients with DHF are outlined in the contingency plan (p. 24) and are based on the guidelines published by WHO in 1987.

Medical personnel resources have not been clearly defined for dengue epidemics. Probably more important is the degree to which personnel have been trained to recognized and manage DHF. A reasonable estimate of personnel requirements would be 1 physician and 2 nurses for every 10 hospitalized pateints. Paramedics and parents can assist in care of patients by giving fluids and observing intravenous infusions and the overall condition of the patients.

The cost of laboratory supplies usch as microcentrifuges, blood pressure cuffs, and microscopes are presented in a budget prepared for Dr. Campillo, the National Director (Annex 2). These particular items should be obtained prior to an epidemic. Intravenous fluids are discussed in the contingency plan (p. 33). SESPAS or PAHO should be able to provide figures for the cost of temporary hospital beds. PROMESE, the program of essential medications has information on the prices of other required medicines the need for which can be gauged on patterns of use and hospitalization trends during the outbreak.

3.2 RESOURCES AVAILABLE IN THE DOMINICAN REPUBLIC

Data provided by the Association of Private Clincis indicate over 3000 private beds exist in addition to the 8708 SESPAS beds in the DR (Annex 3). Most of the private facilities are relatively small with 30 beds or less. The private hospitals or "clinics" are concentrated in Santo Domingo and other large cities, the sites where epidemic dengue transmission is most likely to occur. Bed occupancy rates in public and private hospitals are needed to assess available beds for a dengue epidemic. Assuming approximately 75% overall occupancy, about 2500-3000 beds could be used for hospitalized dengue patients.

The lack of laboratory equipment in Dominican public clinics is described in the contingency plan (p. 32). Microcentrifuges seem to be in short supply and are often broken. Since these devices are usually fairly reliable, I suspect that voltage fluctuations during the frequent power outages may be affecting the life of the equipment. Pediatric blood pressure cuffs would be extrememely useful in outpatient clinics for management of suspect DHF cases. However, careful clinical evaluation and simple tourniquets could substitute for this device. All of the laboratory equipment used to evaluate DHF cases provide basic information which apply to the work-up of myriad common medical conditions. Thus, the cost of laboratory equipment is not equivalent to an expense for one disease alone.

Adequate inexpensive intravenous fluids are easy to obtain in the DR through private industry. Blood and plasma

supplies will be quite stretched without increased community donations. PROMESE and industry can supply information on availability of other medicines and oxygen. The latter items are perhaps not as critical as intravenous fluids and blood supplies.

SESPAS employs 1559 physicians, 3983 nurses, over 5181 health promoters, 583 promoter supervisors, 391 laboratory technicians and 20,000 volunteer vaccinators (1987 Memoria Anual). The medical schools graduate more physicians than the country can employ. Even in a large outbreak, personnel are probably sufficient to handle the patient load, especially with the assistance of medical students and paramedicals. The hours that these personnel work, though, would have to be extended and expenses for wages would likely increase.

Please see Dr. Tonn's report regarding community organizations which could help in both source reduction and set-up of temporary hospitals.

4. MOBILIZATION OF RESOURCES

A crude estimate of the medical costs of a large dengue epidemic in the DF would be $6 million U.S. dollars, if 60,000 patients are hospitalized an average of 5 days and the cost per patient per day is $120 pesos R.D. (personal communication, Dr. Rudyard Corona Bueno. This figure compares with the total budget of SESPAS in 1987 of $188 million pesos R.D., about $28 million U.S. dollars at current exchange rates most of which goes toward salaries. The government will need considerable assistance from international agencies and the private sector to cope with the =cost of a dengue epidemic.

We did not have time to contact the numerous international and private agencies which may be able to provide financial and other aid to the DR in the event of an epidemic. The primary governmental international agencies are, of course, AID (US Foreign Disaster Assistance Office), the Japanese International Cooperative Agency (JICA), and the Federal Republic of Germany (GTZ) and Canadian development agencies. All these agencies have offices in Santo Domingo. The Peace Corps also has a disaster relief plan. The Japanese and the Canadians have recently been described in the press as interested in increasing aid to developing countries. Major private sector benefactors might include Catholic Relief Services (CARITAS) which has a large presence in the DR and Rotary International. Dr. Gubler has gained considerable support from Rotary in Puerto Rico for health education materials and has already initiated contacts with

Rotary in the DR. CARE primarily provides food but does have some medical projects as do several Protestant missionary and relief organizations.

As Dr. Tonn mentions, CEDOIS, the Dominican Center of Social Interest Organizations maintains a current list of private religious and non-religious charitable organizations many of which have medical and public health orientations. Most of these are relatively small and run clinics in certain localized areas of the country; but some have considerable volunteer staff such as the Association of Dominican Scouts (5000 volunteers), the Asociacion de Alfabetizacion y Literatura Cristiana (578 volunteers) and the Servicio Social de Iglesias (754 volunteers). Local dengue medical committees will need to liaison with many of these groups for assistance in coordinating health care delivery during an epidemic.

5.0 THE NATIONAL COMMITTEE FOR CONTROL OF DENGUE EPIDEMICS

A national committee on dengue surveillance and control has existed in the DR in one form or another for several years. Apparently, the committee has not always met regularly and previous plans for clinical workshops and seroepidemiologic investigations have not gone forward to date. The serologic surveillance program through the National Virus Laboratory has made considerable progress.

Dr. Tonn, Dr. Mercedes and I put together a suggested list of committee members representing important institutions and objectives and duties of the committee in the draft contingency plan. These items were presented at the last meeting on June 14, 1988 and discussed briefly. All the institutions have had representatives attend at least one meeting to date except for the Armed Forces, the professional nurses association, and the Association of Private Clinics and Hospitals. Attendance has been compromised by failure to send advance written invitations and in the case of the June 14 meeting by the National Director of Health's late arrival. These problems highlight the need for a professional secretary who can devote considerable time to coordinating committee functions. Dr. Marcos Mercedes has been designated to act in this regard and draft duties and budget for the committee secretary have been included in the contingency plan. In addition to written invitations with follow-up, preparation for each meeting should include typed copies of minutes and an agenda.

Because the National Director of Health may not be able to attend each meeting, a co-chairman to run the meeting should be designated. The most obvious choice for this position would be Dr. Jesus Feris because of his enthusiasm, knowledge of dengue and the priority of clinical training programs which he will undoubtedly play a large role in initiating. Dr. Feris has agreed to assume this position with the approval of the rest of the committee.

Immediate goals of the committee should be to formally approve the objectives and duties and to form subcommittees. This is especially important because the central committee is too large to accomplish practical details. These subcommittees should begin to implement the agreed upon plans. I believe the committee should function as a technical committee with appropriate support from higher level policy makers.

Support from the National Director of Health, a secretary with an adequate budget and clerical assistance, an interested co-chairman and participation of the various institutions with direct roles in managing a dengue outbreak, are all necessary to institutionalizing this committee. Documentation of DHF cases, which is highly likely to occur, will undoubtedly also provide added incentive to the committee.

6.0 CONCLUSIONS

- The DR and, specifically, Santo Domingo is one the highest risk areas in the Caribbean for epidemic dengue and DHF because of the extensive mosquito population, human population density, and the circulation of 3 dengue virus serotypes.

- The awareness of the medical community regarding dengue and DHF is alarmingly low and training of the medical community in the diagnosis and treatment of DHF is critically needed.

- With the exception of personnel and ample private industry capacity to produce intravenous fluids, the medical resources to cope with a dengue epidemic are quite scarce. Particular problems are a lack of reserve hospital beds and inadequate laboratory and diagnostic equipment in outpatient settings.

- An epidemic of DHF will result in significant mortality unless the National Dengue Committee can indeed organize and implement a national training program for physicians and health professionals. Localized contingency hospitalization plans need to be put into place in a collaborative effort between public and private medical institutions.

- The priorities of the National Committee with regard to medical/epidemiologic tasks should be: 1) continued development of the dengue surveillance system, 2) implementation of a clinical training program on dengue and DHF, 3) implementation of a grass roots health education program on the potential dangers of dengue and mosquitoes, and 4) purchase of additional

laboratory equipment, especially microcentrifuges for hematocrit determinations.

- The committee will probably require the continued assistance of consultants. CDC is a convenient source of expertise which is directing a similar effort in Puerto Rico.

- More emphasis should be placed on prevention of dengue epidemics rather than an expensive emergency program which would probably be implemented too late to have a significant impact on transmission. Please see Dr. Tonn's recommendations on rapid response vector control efforts.

- The overall cost (for medical care and vector control) of a massive DHF epidemic similar to the Cuban 1981 epidemic will probably be 10's of millions of U.S. dollars and international assistance will be required.

7.0 RECOMMENDATIONS

1) The National Dengue Committee should finalize its goals and proceed to implement a national dengue emergency plan. A co-chairman and secretary should be appointed and a central office space assigned. The functions of subcommittees with specific tasks will be just as important as those of the national committee.

2) The hospital serologic surveillance program should be expanded within and outside Santo Domingo to include other large cities. Pasantes should be assigned to assist in this program.

3) AID and the National Virus Laboratory should consider the feasibility and desirability of hiring an administrator to assist in monitoring inventories and purchasing of required reagents and laboratory supplies.

4) Dengue and DHF should be made officially reportable in the DR.

5) A training program for physicians on the diagnosis and treatment of dengue and DHF should begin as soon as possible in Santo Domingo and subsequently be extended to other regions. A training module should be developed for this purpose. See specific recommendations in the contingency plan.

6) An emergency hospitalization plan for DHF should be developed for Santo Domingo and other large cities by local physician committees in cooperation with the National Direction for Emergencies and Disasters and Civil Defense.

7) Private and public hospitals and clinics should be surveyed with regard to their occupancy rates and laboratory diagnostic equipment. Maps and charts of hospitals and resources should be maintained (Annex 4). A list of physicians trained in the management of DHF should be kept.

8) Laboratory supplies to perform hematocrits, blood pressure and tourniquet tests, and platelet counts should be obtained for facilities seeing large numbers of acutely febrile patients. The use of voltage surge protectors for microcentrifuges should be explored.

9) Community education on Aedes aegypti source reduction and danger of DHF should be implemented. Maternal-infant health programs of the government such as childhood survival and the numerous private organizations with related programs should be involved as well as government health promoters and volunteer groups such as the boy scouts. PAHO and CDC should be consulted on aspects of Aedes aegypti health education.

10) The surveillance criteria for initiating emergency vector control in the first draft of the contingency plan should probably be revised downward, perhaps halved, if truly effective reductions of adult mosquito populations to prevent further dengue transmission are to take place. Criteria for sporadic DHF cases should probably be revised upward to, perhaps, 10-15 cases. Baseline surveillance data need to be defined further.

11) PROMESE and private industry should be queried as to the cost and availability of secondary medications for dengue treatment.

12) The contingency plan subcommittee should contact international agencies and private donors in the health care field regarding availability of financial assistance for all aspects of the committee's plan including community education.

13) In the event of an alert phase or epidemic, the medical community should be informed immediately. Consultants and international assistance should be requested through channels of protocol. The Red Cross and manufacturers of intravenous fluids should be contacted as soon as possible. Mass media should be used to educate and inform the public.

8. BIBLIOGRAPHY

Please Dr. Tonn's suggestions regarding maintaining a reference library on dengue and Aedes aegypti control. I would like to reemphasize that the 1987 WHO technical guide, Dengue Hemorrhagic Fever: Diagnosis, Treatment and Control should be widely distributed and read. The following are suggested references not mentioned in Dr. Tonn's bibliography:

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ANNEX 1: PERSONS CONTACTED

USAID - DOMINICAN REPUBLIC

Dr. Lee Hougen, Health and Population

Ms. Lisa Early, Health and Population

Mr. Rudi Ellert-Beck, Program Office and Disaster Office

Ms. Lynn Meyer, short-term consultant on nutrition, past work in DR with the University of South Carolina on *Aedes aegypti* community health education

CLINICIANS ON THE NATIONAL DENGUE COMMITTEE

Dr. Jesus M. Feris, Chief Infectious Disease, Robert Reid Cabral Hospital

Dr. Altagracia Guzman, Dominican Medical Association

Dr. Josefina G. Coen, Childhood Survival (PLANSI)

Dr. Rudyard Corona Bueno, Medical Director, Pedro Aybar Hospital

Dr. Santana Vilorio, Medical Director, Las Minas Hospital

Dr. Marcos Mercedes, SESPAS

Dr. Miguel A. Estepan, Director, Central Armed Forces Hospital

Dr. Raquel Fernandez, Social Security (IDSS)

OTHER CLINICIANS CONTACTED

Dr. German Rosario, Chief of Surgery, Central Armed Forces Hospital

Dr. Hugo Mendoza, Director of National Center of Maternal-Child Health Investigations (CENISMI), Robert Reid Cabral Hospital

Dr. T. Gautier, Director, Robert Reid Cabral Hospital

NATIONAL VIRUS LABORATORY

Dr. Ellen Koenig, Laboratory Director

SESPAS

Dr. Miguel Campillo, National Director of Health

Dr. Rosario Valdez Duvall, Acting Epidemiologist

Dr. Marino Arbaje, Director, Health Education

Sr. Federico Arias, Chief, Health Information

Dr. Carmelo Fernandez, Subdirector, National Direction of Emergencies and Disasters

PAHO

Dr. Mirtha Roses Periago, Epidemiologist

CIVIL DEFENSE

Lic. Eugenio Cabral

USAID - VECTOR CONTROL PROJECT

Dr. Mac Tidwell

Sr. Carlos Pena

NATIONAL MALARIA SERVICE (SNEM)

Dr. Francisco Paulino, Chief of Epidemiology

OTHER CONTACTS

Lic. Felicia Sanchez, Administrator, Robert Reid Cabral Hospital

Dr. Raquel Aydar, Dominican Red Cross

Dr. Juan Gasso, Indoquimica

ANNEX 2

PRESUPUESTO DE EQUIPOS DE LABORATORIO PARA DIAGNOSIS DE DENGUE HEMORRAGICO

1. Cada clínica rural debe tener un mango pediátrico para la toma de la presión sanguínea y la prueba de torniquete.

1 mango pediátrico - - RD$ 300 (Pesos R.D.)*

2. Cada subcentro y clínica urbana debe tener una microcentrífugadora que funcione y tubos capilares para hacer hematócrito. Además, deben tener un microscopio para el recuento de plaquetas. El número de tubos capilares que se necesitaría dependerá del número de visitas que anualmente tenga la clínica.

Microcentrifugadora	- RD$4,000	(Pesos R.D.)
Tubos Capilares (1000)	- RD$ 700	"
1 Microscopio	- RD$7,500	"

3. Cada hospital probablemente debe tener a lo menos 2 mangos pediátricos, 2 microcentrifugadoras y 2 microscopios.

*Todos los precios son aproximados y deben ser confirmados por la Secretaría de Salud.

ANNEX 3

ESTABLECIMIENTOS DE SALUD

DRES Tonn and Waterman.

SUB	TIPO	COD EST	CODIGO ENCUES	ZONA	BARRIO	AREA	COD ESP	NOMBRE	DIRECCION	TELEFONO	NUMERO CAMAS
1	1	1	1001	1	68	998		DR. DARIO CONTRERAS	AVE. LAS AMERICAS		199
1	1	2	1002	1	70	998		FCO. MOSCOSO PUELLO	NICOLAS DE OVANDO		58
1	1	3	1003	1	75	998		LUIS EDUARDO AYBAR (MORSAN)	FEDERICO VELAZQUEZ		293
1	1	4	1004	1	78	998		PADRE BILLINI	SANTOME #39		160
1	1	5	1006	1	50	998		DR. ROBERT REID CABRAL	CENTRO DE LOS HEROES		349
1	1	6	1008	1	66	998		MATERNIDAD NTRA. SRA. DE LA ALT.	PEDRO HENRIQUEZ URENA		300
1	1	7	1009	1	87	998		SAN LORENZO DE LOS MINAS	SAN VICENTE DE PAUL		258
1	1	8	1010	1	38	998		GERIATRICO SAN FCO. DE ASIS	AVE. INDEPENDENCIA		243
2	1	9	1064	1	56	998		SALVADOR B. GAUTIER	A. FLEMING		473
2	1	10	1065	1	52	998		MATERNIDAD I. D. S. S.	AVE. BOLIVAR #189		97
1	1	11	1100	2	4	998		RAMON DE LARA	SAN ISIDRO		
1	1	12	1102	2	14	998		VILLA MELLA	VILLA MELLA		
1	1	13	1108	1	38	998		ASILO DE ANCIANOS ROSA DUARTE	CARR. SANCHEZ		
1	8	14	1117	2	1	998		ASILO DE BOCA CHICA	BOCA CHICA		
1	8	15	1119	1	64	998		CRUZ ROJA	MIRA FLORES		
1	1	16	1125	2	12	998		CENTRO DE SALUD INFANTIL HAINAMOSA	SAN LUIS		
1	4	17	1127	1	37	998		CLINICA PERIFERICA B. A., HERRERA	BUENOS AIRES, HERRERA		
1	4	18	1128	1	58	998		CLINICA M. I. HOYO DE CHULIN	CRISTO REY		
6	1	19	1129	1	82	998		CENTRO POPULAR DE SALUD	GUACHUPITA		5
3	1	20	1188	1	54	998		HOSPITAL CENTRAL F.A.P.N.	AV. ORTEGA Y GASSET		
6	7	21	1191	1	52	998		INSTITUTO ONCOLOGICO	ARISTIDES FIALLO CABRAL		200
3	1	22	1196	1	79	998		HOSP. LA BASE NAVAL LA MARINA	SAN SOUCI		5
6	1	23	1241	1	11	998		HOSPITAL DIABETICO	LOS RIOS		18
1	2	24	2011	1	14	998		SUBCENTRO DE SALUD DE VILLA MELLA	VILLA MELLA		
1	2	25	2012	2	4	998		SUBCENTRO DE GUERRA	GUERRA		7
1	2	26	2013	1	5	998		SUBCENTRO DE LAS CAOBAS	LAS CAOBAS		
1	2	27	2014	2	10	998		SUBCENTRO LOS ALCARRIZOS	LOS ALCARRIZOS		
1	2	28	2015	1	86	998		SUBCENTRO LOS MINAS	LOS MINAS NORTE		
1	2	29	2016	1	51	998		SUBCENTRO MATA HAMBRE	MATA HAMBRE		
1	2	30	2017	1	80	998		SUBCENTRO VILLA DUARTE	VILLA DUARTE		
1	2	31	2018	2	1	998		SUBCENTRO DE SALUD DE BOCA CHICA	BOCA CHICA		36
1	2	32	2019	2	9	998		SUBCENTRO DE SALUD DE LA VICTORIA	LA VICTORIA		27
1	7	33	2020	1	66	998		CENTRO SANITARIO DE SANTO DOMINGO	GAIZUE		
1	8	34	2021	1	52	998		LABORATORIO NACIONAL DR. DEFILLO	CIUDAD UNIVERSITARIA		
1	7	35	2022	1	76	998		DISPENSARIO ANTITUBERC. ADULTOS	MEJORAMIENTO SOCIAL		
6	1	36	2023	1	98	998		DISP. ANTITUBERC. DEL NINO	CRISTO REY		103
1	8	37	2095	1	76	998		CENTRO ANTIRRABICO	AVE. DUARTE, MEJORAMIENTO SOCIAL		
3	7	38	2187	1	64	998		CENTRO DE REHABILITACION DE INV.	AV. LEOPOLDO NAVARRO		
3	7	39	2190	1	76	998		INSTITUTO DERMATOLOGICO	F. VELAZQUEZ		
5	3	40	3093	1	56	998		C.M. ALCANTARA Y GONZALEZ	ORTEGA Y GASSET ESQ. A. FLEMING	556-212	256
5	3	41	3094	1	56	998		CENTRO CLINICO LAS MERCEDES	AV. SAN MARTIN #232	565-577	42
5	3	42	3095	1	53	998		C.M. UCE	AV. M. GOMEZ ESQ. P. H. URENA	682-017	149
5	3	43	3096	1	66	998		C. DE PEDIATRIA Y ESP.	AV. INDEPENDENCIA #504	682-779	50
5	3	44	3097	1	66	998		CLINICA GOMEZ PATINO	AV. INDEPENDENCIA #139	689-197	113
5	3	45	3098	1	46	998		CLINICA INDEPENDENCIA	AV. INDEPENDENCIA #301	533-277	23
5	3	46	3099	1	69	998		CLINICA DR. RODRIGUEZ SANTOS	BARTOLOME COLON #20	688-667	132
5	3	47	3100	1	69	998		CLINICA CHAN AQUINO	AMADO GARCIA GUERRERO #265	689-015	100
5	3	48	3101	1	66	998		INST. MATERNIDAD S. RAFAEL	AV. BOLIVAR ESQ. GARCIA GODOY	688-551	44
1	1		1005					Hospital de la cruz Roja	Carretera Sinde Km 13		199

5	3	49	3102	1	67	998	CLINICA ABREU	BELLER #42	682-209	60
5	3	50	3103	1	66	998	CLINICA INTERNACIONAL	MEXICO #39	682-414	18
5	3	51	3104	1	54	998	CENTRO ALBERTINO ROYER	CALLE 27 #11	566-031	30
5	3	52	3105	1	66	998	CLINICA DR. ABEL GONZALEZ	AV. INDEPENDENCIA #109	682-6001	
5	3	53	3106	1	36	998	CENTRO MEDICO DR. BETANCES	BOLIVAR #754	686-414	54
5	3	54	3107	1	66	998	CLINICA YUNEN	AV. BOLIVAR ESQ. MAXIMO GOMEZ	682-737	16
5	3	55	3108	1	66	998	CLINICA ADELAIDA	AV. DUARTE #57	682-592	17
5	3	56	3109	1	68	998	CLINICA SAN RAMON	ABREU #112	689-423	23
5	3	57	3110	1	70	998	CLINICA DR. CEDENO	PEDRO LIVIO CEDENO #39	688-671	20
5	3	58	3111	1	76	998	CLINICA DR. D'GLEO MONTERO	DR. BETANCES #83	689-923	50
5	3	59	3112	1	68	998	CENTRO MEDICO SUERO & ASOC, S.A	30 DE MARZO #26	688-109	20
5	3	60	3113	1	81	998	CENTRO M. ANDRICKSON-GERDO ESP.	AV. LIBERTAD #1	594-354	14
5	3	61	3114	1	76	998	HOSPITAL SAN FCO. DE ASIS	AV. MELLA #1	682-9179	
5	3	62	3115	1	52	998	INTISTUTO ESPAILLAT CABRAL	AV. INDEPENDENCIA #155	688-331	15
5	3	63	3116	1	80	998	CLINICA DR. PENA NUNEZ	REAL #96	689-423	14
5	3	64	3117	1	76	998	CENTRO MED. ALTAGRACIA	FEDERICO VELAZQUEZ #110	687-112	24
5	3	65	3118	1	88	998	CLINICA ALTAGRACIA	SABANA LARGA #96	594-410	61
5	3	66	3119	1	63	998	CLINICA DR. ROSARIO	MANUEL U GOMEZ #238	689-381	20
5	3	67	3120	1	70	998	CENTRO MEDICO LUPERON	PEDRO LIVIO CEDENO #31	688-734	36
5	3	68	3121	1	70	998	CLINICA SAN PANCRACIO	CALLE 29 ESTE #1, ENS. LUPERON	689-185	8
5	3	69	3122	1	78	998	CLINICA DR. MOJICA	JOSE REYES #404	682-652	13
5	3	70	3123	1	62	998	CLINICA HUMILDAD	ANIBAL ESPINOSA #101	682-112	10
5	3	71	3124	1	69	998	CLINICA DR. VARGAS	AV. SAN MARTIN #123	566-4511	
5	3	72	3125	1	77	998	CLINICA DR. VELEZ SANCHEZ	AV. DUARTE #180	689-933	10
5	3	73	3126	1	62	998	CENTRO M. DUARTE	AV. DUARTE	685-3855	
5	3	74	3127	1	66	998	CLINICA DR. MELGEN S.A	AV. BOLIVAR #51	652-475	3
5	3	75	3128	1	70	998	CLINICA DR. FERNANDEZ	18 SUR #6, ENS. LUPERON	685-6677	
5	3	76	3129	1	70	998	CLINICA DR. MORILLO	ALBERT THOMAS #303	682-153	6
5	3	77	3130	1	70	998	CLINICA DR. CASTRO	PADRE CASTELLANOS #346	685-6030	
5	3	78	3131	1	43	998	CLINICA DUARTE (RICHARDSON)	27 DE FEB. #382	567-147	28
5	3	79	3132	1	63	998	CLINICA NUNEZ OLIVERO	PENA BATLLE #51	686-432	6
5	3	80	3133	1	68	998	CLINICA DE OJOS Y ESPEC.	30 MARZO #54	688-4526	
5	3	81	3134	1	36	998	CENTRO C. MIRADOR	BOLIVAR #515	532-177	13
5	3	82	3135	1	66	998	CENTRO DE ENDOCRINOLOGIA	DR. DELGADO #2	687-2090	
5	3	83	3136	1	66	998	CENTRO DE GASTROENTEROLOGIA	BOLIVAR #195	689-7626	
8	7	84	3137	1	76	998	CENTRO. MAT. INF. ACTIVO 20-30	FEDERICO VELAZQUEZ	688-2111	
5	3	85	3138	1	76	998	CENTRO M. MARIA DOLORES	HECTOR J. DIAZ	688-6889	
5	3	86	3139	1	67	998	CLINICA DR. LA PAIX	ML. U. GOMEZ #228	688-1313	
5	3	87	3140	1	65	998	CLINICA DR. BENCOSME	SAN JUAN BOSCO #116	682-777	20
5	3	88	3141	1	66	998	URGENCIAS PEDIATRICAS	AV. BOLIVAR #102 ESQ. DELGADO	682-7365	
5	3	89	3142	1	63	998	DRS. RODRIGUEZ GARCIA	EL SEYBO ESQ. PENA BATLLE	565-074	4
5	3	90	3143	1	78	998	CLINICA DR. MARTINEZ FELICIANO	JUANA SALTITOPA #136	689-561	4
5	3	91	3144	1	81	998	CLINICA DR. MC'DOUGALL	AV. VENEZUELA #102	594-472	6
5	3	92	3145	1	77	998	CLINICA DR. RESTITUYO VARGAS	FCO. HENRIQUEZ Y CARV. #214	689-346	13
5	3	93	3146	1	81	998	CLINICA DR. MEDINA	MASONERIA #3	596-890	42
5	3	94	3147	1	62	998	CLINICA BERENICE	R. RAMIREZ #108	689-2650	
5	3	95	3148	1	77	998	C. M. DOM. DE ORTOPEDIA Y TRAUM.	V. NOBLE #18 ESQ. BENITO GONZ.	689-935	5
5	3	96	3149	1	63	998	GRUPO M. MAURICIO BAEZ	MAURICIO BAEZ #60	532-247	18
5	3	97	3150	1	77	998	CLINICA DR. ARIAS	DR. BETANCES #199	689-356	10
5	3	98	3151	1	78	998	CLINICA DR. GOICO	MERCEDES #121	682-2038	
5	3	99	3152	1	87	998	CLINICA SAN JOSE	ARZ. F. DE NAVARRETE #3	594-314	20
5	3	100	3153	1	41	998	CLINICA DR. NEMESIO JIMENEZ	BARTOLOME O. PEREZ #66	533-1444	
5	3	101	3154	1	63	998	CLINICA LA FE	PENA BATLLE #60	565-579	9
5	3	102	3155	1	77	998	CLINICA DR. WILLY SUERO	CARACAS #86	687-306	5
5	3	103	3156	1	70	998	CLINICA DR. RAFAEL M. JIMENEZ	27 OESTE #16	689-544	21
5	3	104	3157	1	64	998	CENTRO M. 27 DE FEBRERO	27 DE FEBRERO #428	565-9211	

5	7	161	3235	1	69	998	DR. MARINEZ	HNOS PINZON	
5	3	162	3236	1	69	998	DR. TEJADA FLORENTINO	MANUELA DIEZ	6
5	3	163	3237	1	69	998	CENTRO MED. SAN JOSE	BALTAZAR ALVAREZ D LOS REYES	
5	3	164	3238	1	66	998	CENTRO MED. CUMBRE	DR. DELGADO	13
5	3	165	3239	1	66	998	CENTO MED. DR. BAUTISTA	CESAR NICOLAS PENZON	8
5	3	166	3242	1	88	998	DR. CAMILO	SABANA LARGA #5	7
5	7	167	3243	1	77	998	STA ROSA	PARIS	
5	3	168	3244	1	63	998	PEREZ MOLINA	MARCOS ADON ESQ. J. DE JS. RAVELO	
5	3	169	3245	1	77	998	DR. MIESES	PARIS #49	10
5	7	170	3246	1	77	998	DR. PEREZ PLACIDO	BENITO GONZALEZ #88	
5	7	171	3247	1	51	998	SOCRATES ZAPATA	CALLE IRA, MATA HAMBRE	
5	3	172	3250	1	85	998	DR. CORNELIO	PRINCIPAL	5
5	3	173	3251	1	48	998	HONDURAS	AV. INDEPENDENCIA	18
5	7	174	3252	1	66	39	GRUPO MED. BOLIVAR	AV. BOLIVAR	
5	3	175	3254	1	47	998	DR. JIMENEZ	DIAGONAL	6
5	3	176	3255	1	66	998	ALFARO VISION	AV. BOLIVAR #2	
5	7	[illegible]	3256	1	54	998	LERD	AV. TIRADENTES, NACO	
5	3	178	3261	1	88	998	BETHEL	SAN VIC. DE PAUL	28
5	3	179	3264	1	76	998	SAN MIGUEL	FEDERICO VELAZQUEZ #25	4
5	3	180	3267	1	88	998	MATERNIDAD LA PAIX	SAN VIC. DE PAUL #216	6
5	3	181	3268	1	84	998	DR. ABELARDO	PABLO NERUDA #6	8
5	7	182	3269	1	95	998	DR. MUNOZ	CARR. MENDOZA	
5	3	183	3271	1	49	998	DR. MACKINNEY	EL CACIQUE	
5	3	184	3272	1	86	998	DR. ALBURQUERQUE	FDEZ. DE NAVARRETE #202	
5	3	185	3273	1	86	998	DR. URENA	SAN VIC DE PAUL #268	15
5	3	186	3277	1	66	998	CENTRO MED. DR. MUNOZ	AV. INDEPENDENCIA	
5	3	187	3278	1	86	998	CENTRO MED. LA HUMANITARIA	FERNANDEZ DE NAVARRETE # 64	
5	3	188	3280	1	88	998	CENTRO MED. ALMONTE ALVAREZ	SAN VIC. DE PAUL #120	10
5	3	189	3281	1	4	998	CENTRO MED. DR. JEFERSON	ANT. CARR. DUARTE	10
5	7	190	3282	1	65	998	GRUPO MED. DON BOSCO	SAN JUAN BOSCO	
5	3	191	3283	1	5	998	DR. MEDRANO	AV. LAS PALMAS #36	8
5	7	192	3288	1	37	998	BUENOS AIRES	BUENOS AIRES	
5	3	193	3290	1	84	998	LOS TRES BRAZOS	LOS TRES BRAZOS	9
5	7	194	3291	1	64	998	DR. NARANJO	LEOPOLDO NAVARRO	
5	7	195	3292	1	64	998	DR. NAVARRO	LEOPOLDO NAVARRO	
5	3	196	3293	1	13	998	CENTRO MED. LAS PALMAS	ANT. CARR. DUARTE #46	10
5	3	197	3294	1	91	998	COPLIN	LOS MAMEYES	5
5	3	198	3295	1	86	998	GRUPO MED ENCARNACION	SAN VIC. DE PAUL	4
5	3	199	3297	1	63	998	GRUPO MED. ASOCIADOS	TUNTI CACERES #174	17
5	7	200	3298	1	66	998	IBERO AMERICANA (UNIBE)	AV. FRANCIA	
5	3	201	3299	1	96	40	RAVELI	CARR. MELLA	36
5	3	202	3301	2	10	998	DUARTE	LOS ALCARRIZOS	
6	7	203	3302	2	10	998	C. C. LOS AMERICANOS (CONSULT.)	CANTA LA RANA	
5	3	204	3304	2	10	998	SANTO AQUINO	LOS ALCARRIZOS	11
5	3	205	3307	1	33	998	SANTISIMA TRINIDAD	LOS PRADOS	
5	3	206	3308	1	43	998	CENTRO MED. QUISQUEYA	AV 27 DE FEB. #458	7
5	3	207	3309	1	53	998	CENTRO MED. LA ESPERILLA	CALLE 21, LA ESPERILLA	
5	7	208	3310	1	19	998	DR. PENA	CARR. SANCHEZ	
5	7	209	3311	1	82	998	SAN RAMON	LOS GUANDULES	
5	3	210	3313	1	70	998	PASTEUR	ENS. LUPERON	
5	7	211	3315	1	88	998	DRA. GLADYS MARTINEZ	MERINO	
5	7	212	3316	1	85	998	DR. ROJAS	CARR. SABANA PERDIDA	
5	3	213	3317	1	87	998	SAN JOSE	PTE. RAFAEL ESTRELLA URENA	
5	3	214	3318	1	96	998	CENTRO MED. SAN FCO.	SAN FRANCISCO	10
5	7	215	3322	1	68	998	DR. ALEJANDRO CORNIELLE	SAN CARLOS	
5	3	216	3325	1	86	998	GRUPO MED. POPULAR	FERNANDEZ DE NAVARRETE	

5	3 217	3327	1	90	998	CENTRO MED. MASONICO	AV. EL FARO	88
5	3 218	3328	2	10	998	CENTRO MED. LOS ALCARRIZOS	AV. DUARTE	
5	3 219	3329	1	77	998	SANTANA	MELLA	
5	7 220	3331	2	14	998	DR. MATIAS	VILLA MELLA	6
5	7 221	3332	2	14	998	DR. ROBLES	VILLA MELLA	
5	7 222	3333	1	60	998	DR. RAMIREZ	KM 10 1/2, SANTA CRUZ	
5	7 223	3334	1	33	998	DR. PANCHIN	LOS PRADOS	
5	3 224	3334	1	67	2	DR. ARIZA	FABIO FIALLO	
5	3 225	3335	1	76	998	SAN ANTONIO	ANA VALVERDE	19
5	7 226	3336	1	77	998	DE LEON	AV. DUARTE	6
5	7 227	3339	1	77	998	DR. LORA	PARIS ESQ. DR.BETANCES	
5	3 228	3340	2	10	998	C. MED. MENDEZ VASQUEZ	DUARTE #176	
5	3 229	3342	2	10	998	CENTRO MED. QUINONES	CALLE DUARTE #282	3
5	3 230	3344	1	67	998	CENTRO MED. BAUTISTA	JOSE GABRIEL GARCIA	18
5	3 231	3345	2	10	998	CENTRO MED DR. CORNELIO	DUARTE, LOS ALCARRIZOS	
5	3 232	3346	1	86	998	CENTRO CLINICO CENTRAL	SAN VIC. DE PAUL	
5	3 233	3347	1	47	998	CENTRO MED. 30 DE MAYO	AV. INDEPENDENCIA	5
5	3 234	3348	1	74	998	DR. PENA YAPOUR	PADRE CASTELLANOS #192	
5	7 235	3349	1	47	998	DR. JACOBO	AV. INDEPENDENCIA	8
5	3 236	3350	1	86	998	C. DE OBSTETRICIA Y GINECOL.	AV. INDEPENDENCIA 451	
5	3 237	3351	1	88	998	CORAZON DE JESUS	SAN VIC. DE PAUL	13
5	3 238	3352	1	95	998	SANTO DOMINGO	SAN VIC. DE PAUL #101	6
5	3 239	3353	1	95	9	SAN MIGUEL	CARR. DE MENDOZA #154	13
5	7 240	3355	2	14	998	STA LUCIA	VILLA MELLA	18
5	7 241	3356	2	14	998	GUANUMA	GUANUMA	
5	7 242	3357	2	14	998	SAN ANTONIO	VILLA MELLA	
5	3 243	3358	1	2	998	EMMANUEL	ISABEL AGUIAR #208	
5	3 244	3359	1	2	998	LA CONCHA	LA ALTAGRACIA	
5	3 245	3361	1	98	998	DR. PUJOLS	OVANDO 426	8
5	7 246	3362	2	10	998	GRUPO BAEZ	DUARTE	
5	7 247	3366	1	56	998	DRA. NIDIA BAEZ	MAURICIO BAEZ	
5	7 248	3367	1	80	998	DR. ROSARIO	VILLA DUARTE	
5	3 249	3368	1	97	998	EMERGENCIAS MEDICAS	AV. CHARLES DE GAULLE	5
	3 250	3370	1	72	998	SAN GREGORIO	STO CURA DE ARS.	14
	3 251	3371	1	70	998	CENTRO MED. JAQUEZ	ALBERT THOMAS	
	7 252	3372	1	80	998	SANTA ISABEL	VILLA DUARTE	
	7 253	3373	1	70	998	DR. BAEZ	ALBERT THOMAS	
	7 254	3374	1	63	998	DR. ATILES	BARTOLOME COLON	
	7 255	3375	1	37	998	LA BANDERA	MEXICO, LA ALTAGRACIA	
	3 256	3376	1	37	998	HERRERA PINA	MEXICO, LA ALTAGRACIA	28
	3 257	3377	1	44	998	CENTRO COLOSO	AV. LOPE DE VEBA	
	3 258	3378	1	2	998	ALTAGRACIA	LA ALTAGRACIA	
	3 259	3380	1	37	998	SAN ANTONIO	MEXICO LA ALTAGRACIA	12
	3 260	3381	1	2	998	TROFEL	LA ALTAGRACIA	13
	3 261	3382	1	37	998	PROSALBA	MEXICO	
	7 262	3385	2	14	998	DR. GARCIA	PRINCIPAL	
	3 263	3388	1	70	998	PROVIDENCIAL	OVANDO ESQ. DUARTE	4
	7 264	3389	1	98	998	EDEN	CALLE 39, CRISTO REY	
	3 265	3390	1	98	998	DR. JORGE GONZALEZ	OVANDO #480	8
	7 266	3395	1	70	998	SAN RAFAEL	OVANDO	
	3 267	3398	1	70	998	PAPI FERNADEZ	AV. PEDRO LIVIO CEDENO #39	11
	3 268	3399	1	88	998	GRUPO MED. UNIDO	SAN VIC. DE PAUL	7
	7 269	3400	1	68	998	DR. HOLGUIN	SAN CARLOS	
	7 270	3401	1	88	998	DRA. ADELINA	CLUB 20 - 30, ALMA ROSA	
	7 271	3402	1	63	998	DR. NUNEZ	TUNTI CACERES	
	3 272	3403	1	72	998	NUNEZ	SIMON BOLIVAR	5

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5	3 273	3407	1	56	998	INST.DEL HIGADO Y VIAS DIGEST.	ARTURO LOGRONO #159	3
5	3 274	3408	1	66	998	GRUPO MED. GAZCUE	DR. DELGADO	
5	3 275	3409	1	15	998	DR. CASTILLO REYES	ISABEL AGUIAR	6
5	3 276	3410	1	37	998	CENTRO MD. RAFEIY	BARRIO ALTAGRACIA	
5	3 277	3414	1	69	998	CENTRO DE EPILEPSIA	VILLA CONSUELO	
5	3 278	3415	1	68	998	DR. FRANCO	EMILIO PRUD'HOMME	15
5	7 279	3416	1	61	998	SAN JUAN BAUTISTA	LA ZURZA	
5	7 280	3417	1	98	998	DR. LORA ACOSTA	CALLE 42, CRISTO REY	
5	3 281	3418	1	15	998	DR. FELIX	ISABEL AGUIAR	10
5	7 282	3419	1	66	998	CENTRO DE RADIOGRAFIAS	DR. DELGADO	
5	3 283	3420	1	61	998	JUAN PABLO DUARTE	RESP. MARIA MONTES #156	5
5	3 284	3424	1	63	998	CENTRO MED. POPULAR	CALLE 23 #29, VILLA JUANA	4
5	7 285	3425	1	72	998	DR. MARCOS	SAN VIC. DE PAUL	
5	3 286	3427	1	76	998	CENTRO MED. ENATALO	FEDERICO VELAZQUEZ	
5	3 287	3429	2	14	998	ANGELA	VILLA MELLA	
5	7 288	3430	1	71	998	MICHELL	CALLE 8A ESQ. DURATE	
5	7 289	3431	1	63	998	DR. GOMEZ	TUNTI CACERES	
5	3 290	3432	1	80	998	SAN EVANGELISTA	25 DE FEBRERO	
5	7 291	3433	1	95	998	CENTRO MED. LA ESPERANZA	CARR. DE MENDOZA	
5	3 292	3434	1	96	998	DUARTE #435	AV. CHARLES DE GAULLE	
5	7 293	3436	1	78	998	LUISA MARTINEZ	MERINO ESQ. MERCEDES	
5	3 294	3437	2	14	998	DR. SANTANA	VILLA MELLA	
5	3 295	3438	1	98	998	DR. MELO VILLAR	CALLE 41 #103, CRISTO REY	9
5	3 296	3441	1	71	998	CENTRO MED. JIMENEZ	DIEGO VELAZQUEZ #10	7
5	7 297	3442	1	66	6	CENTRO MED. JOSE CONTRERAS	AV. JOSE CONTRERAS #5	
5	3 298	3443	1	14	998	CENTRO MED. GREGORIO LUPERON	ANTONIO ALVAREZ	
5	7 299	3445	1	5	998	DR. CUELLO	LAS PALMAS	
5	3 300	3448	1	85	998	MATERNIDAD LA PAZ	SABANA PERDIDA	6
5	3 301	3449	1	5	998	DR. RODRIGUEZ	CALLE 2DA., LAS CAOBAS	
5	3 302	3450	1	95	998	CENTRO MEDICO MI HOGAR	CARRETERA DE MENDOZA #362	5
5	7 303	3451	1	76	998	DR. CONCHA	MANUELA DIEZ	
5	3 304	3452	1	94	998	DR. SCHIFFINO	VILLA FARO	
5	7 305	3453	1	70	998	DR. TEJADA	ENS. LUPERON	
5	7 306	3454	1	85	998	DR. CASTRO	MANZANA J, SABANA PERDIDA	
5	7 307	3455	1	70	998	DR. ROJAS	JOSEFA BREA	
5	7 308	3456	1	78	998	DR. GONZALEZ	RESTAURACION	
5	7 309	3457	1	56	998	DR. LUIS PUELLO	LA FE	
5	7 310	3458	1	77	998	DR. MORENO	DR. BETANCES	
5	7 311	3459	2	10	998	SAN MIGUEL	LOS ALCARRIZOS	
5	7 312	3460	1	71	998	LA MILAGROSA	PADRE CASTELLANOS	
5	7 313	3461	1	60	998	SANTA CRUZ	CALLE HNAS. MIRABAL	
5	3 314	3463	1	14	998	CENTRO MED. VILLA MELLA	CARRETERA MELLA	8
5	3 315	3465	2	1	998	LOS COQUITOS	DUARTE	
5	3 316	3466	1	78	998	CENTRO MED. JUAN	CALLE SALOME URENA	
5	3 317	3467	2	1	998	CENTRO MEDICO DR. PEREZ	BOCA CHICA	
5	7 318	3470	1	66	45	CENTRO MED. MAIRENI CABRAL	DR. DELGADO	
5	3 319	3472	1	81	998	CENTRO MED. OZAMA	ENS. OZAMA	
5	7 320	34[illegible]	2	1	998	DR. CONTRERAS	BOCA CHICA	
5	3 321	3475	1	19	998	CENTRO MED. MELO SANCHEZ	INVI	
5	3 322	3481	2	10	998	SAN RAFAEL	LOS ALCARRIZOS	
5	3 323	3482	1	33	998	GRUPO MED.	LOS PRADOS	
5	3 324	3483	1	7	998	SAN RAFAEL	LOS PERALEJOS	
5	7 325	3485	1	2	998	DR. PEREZ	CENTRAL, LA ALTAGRACIA	
5	7 326	3486	1	15	998	DR. CHAVEZ	CENTRAL	
5	7 327	3487	1	1	998	DR. JAVIER	RES. STO. DOMINGO	
5	3 328	3488	1	3	998	CENTRO MED. LA ESMERALDA	ENGOMBE	

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3 329	3489	1	3	998	CENTRO MED. FAMAR	ENGOMBE	
7 330	3490	2	12	998	DR. FEFEVO	JUAN ROSA #10	
7 331	3491	2	10	998	DR.PAREDES #	ANTONIO GOMEZ	
3 332	3493	2	4	998	CENTRO MED DR. PAULINO	GUERRA	
3 333	3494	2	4	998	CENTRO MED. GUERRA	GUERRA	
3 334	3495	1	50	998	CENTRO MED. MATERNO INF.	AV. INDEPENDENCIA	
3 335	3498	1	86	998	LOS MINAS	AV. SAN VIC. DE PAUL	
7 336	3499	1	83	998	DR. MECIO	CALLE 18, GUALEY	
3 337	3500	1	95	998	CENTRO DE ESPECIALIDADES	CALLE 2DA, MENDOZA	
3 338	3501	1	60	998	CENTRO MED.MARIA	BUENA VISTA	8
7 339	3502	1	70	998	DR. SOTO PEGUERO	OVANDO	
7 340	3505	1	32	998	DR. MARIA DE DIOS	ALBERTO DE FIALLO	
7 341	3506	1	5	998	DR. MORETTA #	LAS PALMAS	
33 342	3508	2	14	998	MARANATA	PROGRESO	5
7 343	3509	1	95	998	DR. OVALLES	CALLE 4TA, MENDOZA	
3 344	3510	1	70	998	DR. MOJICA #	CALLE 2DA ESQ. DUARTE	
3 345	3511	1	91	998	CENTRO CLINICO REAL	REAL #11, VILLA DUARTE	7
3 346	3513	1	96	998	SAN FCO.	CARR. MELLA	
7 347	3514	1	66	998	CENTRO DE ACUP. DR.PAPPATERRA	AV. INDEPENDENCIA	
7 348	3515	1	71	998	INST. DE SERVICIOS MED.	JOSEFA BREA	
7 349	3516	1	30	998	ARROYO HONDO	AV. CIRCUNVALACION	
7 350	3518	1	75	998	ALBERT THOMAS	ALBERT THOMAS	
7 351	3519	1	28	998	DRA. EMILIA OLEAGA	AV. LOS ARROYOS	
3 352	3520	1	15	998	LA MILAGROSA	AV. ISABEL AGUIAR #214	
7 353	3521	1	66	998	INST. REUMATOLOGICO	ROSA DUARTE ESQ. MEXICO	
7 354	3523	1	54	998	MACO	FANTINO FALCON	
7 355	3524	1	12	998	ENRIQUILLO	BARRIO ENRIQUILLO	
3 356	3525	1	4	998	UNIVERSAL, DR. BALCACER A.	KM 10 1/2, LA ROSA	6
7 357	3526	1	63	998	SANTA CLARA	AMERICO LUGO	
3 358	3527	1	63	998	CENTRO MED. DR.LLUBERES	TUNTI CACERES	12
3 359	3528	1	81	998	MIGUEL SANCHEZ	SABANA LARGA #5	4
3 360	3529	1	81	998	DR. CUEVAS	SABANA LARGA	9
3 361	3530	1	81	998	CENTRO MED. DR. PEREZ	SABANA LARGA	2
7 362	3531	1	97	998	CENTRO CHARLES DE GAULLE	JUAN PABLO DUARTE	
3 363	3533	1	61	998	C. DE GINECOLOGIA CASTRO S.	SABANA LARGA	15
3 364	3534	1	96	998	DR. PEREZ CABRERA	K.M. 8 1/2, CAR. MELLA, CANSINO	5
3 365	3535	1	74	998	CENTRO MED. DR. GONZALEZ	F.J. DIAZ #96	8
3 366	3536	1	58	998	CLINICA DR. REYES	AV. LOS MARTIRES #160	7
7 367	3537	1	66	39	GRUPO MED BOLIVAR II	JOSE JOAQUIN PEREZ	
3 368	3538	2	5	998	CLINICA LAS ROSAS	K.M. 12 1/2, CAR. SANCHEZ, HAINA	
3 369	3540	1	98	998	CLINICA DR. MATEO	CRISTO REY	
3 370	3541	1	69	998	FRANCISCO LUCIANO	AV. DUARTE #164	4
3 371	3542	1	60	998	ABREU	K.M.10 1/2	6
3 372	3543	1	14	998	CENTRO MED. ANSELA MA.	CALLE 6, VILLA MELLA	5
3 373	3544	1	60	998	CENTRO MED. STA CRUZ	SANTA CRUZ	12
3 374	3545	2	10	998	CENTRO MED. ELIAS SANTANA	CANTA LA.RANA	30
3 375	3546	2	14	998	CENTRO MED. DR. MELO	VILLA MELLA	9
3 376	3547	1	5	998	CENTRO MED. DR. ARAGON	AV. LAS PALMAS	8
3 377	3548	1	12	998	CLINICA DEL INGENIO OZAMA	SAN LUIS	12
3 378	3549	1	69	998	CLINICA DR. GUZMAN SALAN	VICINI PERDOMO	5
3 379	3550	1	82	998	CENTRO MED. SAN RAMON	PADRE CASTELLANOS ED.11	6
3 380	3551	1	75	998	CENTRO MD. MISIONERO	RESP 8 ESQ. LUIS REYES	9
3 381	3552	1	83	998	CLINICA EL MESIAS	OSCAR SANTANA #15	3
3 382	3553	1	62	998	CLINICA DR. CONTRERAS	AV. LOS MARTIRES #37	9
3 383	3554	1	85	998	CENTRO MD. SAN RAMON	PRINCIPAL	30
3 384	3555	1	76	998	TEJERA FLORENTINO	AV.DUARTE #254	13

5	3 385	3557	1	96	998	DR. ROJAS	L.M. 5 1/2, CAR. MELLA, CANSINO	6
5	3 386	3558	1	98	998	FIGUEROA MATEO	MAXIMO GOMEZ ESQ. CALLE 38	9
5	3 387	3559	1	77	998	DR. PUJOLS	DUARTE #147	6
5	3 388	3560	1	83	998	CENTRO MED. HORIZONTES	OSCAR SANTANA #97	7
5	3 389	3561	1	78	998	URGENCIAS MEDICAS	ISABEL AGUIAR #122	3
5	3 390	3562	1	76	998	CLINICA DR. DINZEY	JOSE REYES	
5	3 391	3563	1	69	998	GRUPO MED. SAN PABLO	JUAN E. JIMENEZ	6
5	3 392	3564	1	84	998	GRUPO MED. LA ESPERANZA	CAAMANO	3
5	3 393	3565	1	66	998	CENTRO MAT. INF. Y ESP.	AV. SAN VIC. DE PAUL #50	5
5	3 394	3566	1	85	998	CENTRO STA ANA	MARGINAL #14	6
5	3 395	3567	1	63	998	CLINICA VARGAS CANDELARIO	AV. SAN MARTIN	.
5	3 396	3568	1	87	998	CLINICA DR. BAEZ	ESTRELLA URENA	4
5	3 397	3569	1	63	998	GRUPO MEDICO STA ANA	AMERICO LUGO #50	7
5	3 398	3570	1	15	998	CLINICA HOGAR DE LA SALUD	CALLE 2DA. #3, DUARTE, HERRERA	5
1	4 399	4024	1	43	998	CLINICA ENSANCHE QUISQUEYA	ENS. QUISQUEYA	
1	4 400	4025	1	48	998	CLINICA URBANA 30 DE MAYO	30 DE MAYO	
1	4 401	4026	1	15	998	CLINICA URBANA LA ALTAGRACIA	HERRERA	
1	4 402	4027	1	98	998	CLINICA URBANA EL CALICHE	CRISTO REY	
1	4 403	4028	1	86	998	CLINICA URBANA SAN LUCAS	CATANGA	
1	4 404	4029	1	11	998	CLINICA URBANA LA ESPERANZA	LOS RIOS	
1	4 405	4030	1	54	998	CLINICA URBANA LA YUCA	NACO	
1	4 406	4031	1	11	998	CLINICA URBANA LAS TRES AVENIDAS	LOS RIOS	
1	4 407	4032	1	72	998	CLINICA URBANA SIMON BOLIVAR	SIMON BOLIVAR	
1	4 408	4033	1	83	998	CLINICA URBANA OSCAR SANTANA	GUALEY	
1	4 409	4034	1	2	998	CLINICA URBANA DR. DIAZ PINEYRO	LA ALTAGRACIA	
1	4 410	4035	1	75	998	CLINICA URBANA LA FUENTE	MARIA AUXILIADORA	
1	4 411	4036	1	13	998	CLINICA URBANA JUAN PABLO DUARTE	JUAN PABLO DUARTE, HERRERA	
1	4 412	4037	1	95	998	CLINICA URBANA MENDOZA	MENDOZA	
1	4 413	4038	1	76	[illegible]	CLINICA URBANA YOLANDA GUZMAN	MEJORAMIENTO SOCIAL	
1	4 414	4040	1	87	[illegible]	CLINICA URBANA FUERZAS ARMADAS	LOS MINAS SUR	
1	4 415	4041	1	30	998	CLINICA URBANA AGUSTINITA	VIEJO DE ARROYO HONDO	
1	4 416	4042	1	86	998	CLINICA URBANA VIETNAM	VIETNAM, LOS MINAS NORTE	
1	4 417	4043	1	69	998	CLINICA URBANA VILLA CONSUELO	VILLA CONSUELO	
1	4 418	4044	1	83	998	CLINICA URBANA GUALEY	GUALEY	
1	4 419	4045	1	52	998	CLINICA URBANA UASD	CIUDAD UNIVERSITARIA	
1	4 420	4046	1	11	998	CLINICA URBANA LOS RIOS	LOS RIOS	
1	4 421	4048	1	61	998	CLINICA URBANA LA ZURZA	LA ZURZA	
1	4 422	4049	2	13	998	CLINICA URBANA LA CUBA DE PEDREGAL	PEDREGAL	
1	4 423	4050	2	1	998	CLINICA URBANA MONTE ADENTRO	LA CALETA	
1	5 424	5051	2	11	998	CLINICA RURAL MANOGUAYABO	MANOGUAYABO	
1	5 425	5052	2	14	998	CLINICA RURAL HACIENDA ESTRELLA	VILLA MELLA	
1	5 426	5053	2	10	998	CLINICA RURAL LOS ALCARRIZOS	LOS ALCARRIZOS	
1	5 427	5054	2	4	998	CLINICA RURAL MATA DE PALMA	GUERRA	
1	5 428	5055	2	85	998	CLINICA RURAL SABANA PERDIDA	SABANA PERDIDA	
1	5 429	5056	2	12	998	CLINICA RURAL EL BONITO	SAN LUÍS	
1	5 430	5057	2	11	998	CLINICA RURAL HATO NUEVO	HATO NUEVO	
1	5 431	5059	2	3	998	CLINICA RURAL EL ABANICO	EL COCO DE PEDRO BRAND	
1	5 432	5060	2	3	998	CLINICA RURAL LAS GUAYIGAS	EL COCO DE PEDRO BRAND	
1	5 433	5061	2	7	998	CLINICA RURAL PALMAREJOS	EL NIGUERO	
1	5 434	5062	2	14	998	CLINICA RURAL SANTA CRUZ	VILLA MELLA	
1	5 435	5063	2	4	998	CLINICA RURAL EL MAMON	GUERRA	
2	6 436	6066	1	78	998	ZONA A DE SANTO DOMINGO	MERCEDES #51	
2	6 437	6067	1	70	998	ZONA B DE SANTO DOMINGO	JOSEFA BREA	
2	6 438	6068	1	56	998	ZONA C DE SANTO DOMINGO	PARAGUAY	
2	6 439	6069	1	20	998	ZONA D DE SANTO DOMINGO	AVE. IRA A. DUVERGE	
2	6 440	6070	1	81	998	ZONA E DE SANTO DOMINGO	MASONERIA	12

5	3 105	3158	1	63	998	CLINICA DR. CHEVALIER	MOCA #183	687-201	6
5	3 106	3159	1	76	998	CLINICA DR. SANTANA SABINO	PADRE CASTELLANOS #255	682-757	3
5	3 107	3160	1	66	998	CENTRO CARDIOVASCULAR	J. PERDOMO #34	682-607	12
5	3 108	3161	1	81	998	CLINICA DR. MARTINEZ AYBAR	SABANA LARGA #134	594-396	7
5	3 109	3162	1	15	998	CENTRO M. METROPOLITANO	ISABEL AGUIAR #6	532-596	10
5	3 110	3163	1	77	998	CENTRO MEDICO SANTA LUCIA	JUANA SALTITOPA #136	689-455	6
5	3 111	3164	1	89	998	CLINICA DR. ROSARIO	CALLE 6 #23, LAS AMERICAS	596-8909	→ NO
5	3 112	3165	1	88	998	CLINICA DR. ORTEGA BONZAN.	CRUZ DE MENDOZA, K.M. 5	594-4595	→
5	3 113	3166	1	86	998	CENTRO MEDICO INTRENACIONAL	SAN VICENTE DE PAUL #120	594-5598	→ 14
5	3 114	3167	1	69	998	C. OTORRINO Y ESP.DR MEJIA J	27 DE FEB ESQ. FCO H CARVAJAL	682-015	16
5	3 115	3168	1	77	998	DR. MIRANDA	JUAN DE MORFA		→ 47
5	3 116	3169	1	70	998	DR. JAQUEZ	ALBERT THOMAS ESQ. 37 ESTE		12
5	3 117	3171	1	88	998	SOTO GONZALEZ	AV.SAN VICENTE DE PAUL		20
5	3 118	3172	1	71	998	DR.TEJADA ANDUJAR	BARNEY MORGAN #129		15
5	3 119	3173	1	74	998	DR. YAPOUR	CENTRAL, ENS. ESPAILLAT		→
5	3 120	3174	1	70	998	DR. VANDERLINDER	ENS. LUPERON		→ 32
5	3 121	3175	1	87	998	DR. WILLIAM	ROSA DUARTE ESQ. SABANA LARGA		→ 13
5	3 122	3176	1	83	998	DR. BORBON	DIEGO VELAZQUEZ		15
5	3 123	3177	1	68	998	DR.GARRIDO	16 DE AGOSTO		→
5	3 124	3178	1	74	998	CENTRO MED. SAN ELIAS	DIAGONAL IRA 20		→ NO TI
5	3 125	3179	1	87	998	CENTRO MED. PITER	ESTRELLETA		→
5	3 126	3180	1	66	998	GRUPO MED. CRUZ AZUL	JOSE CONTRERAS #8		→
5	3 127	3182	1	77	998	DR. MIRANDA	JUAN DE MORFA		20
5	3 128	3183	1	77	998	CENTRO MED. LUPITA	FCO. HENRIQUEZ Y CARVAJAL		→
5	3 129	3185	1	68	998	CENTRO MED. RICHARDSON	30 DE MARZO		17
5	7 130	3186	1	63	998	DR. VALLEJO	JUAN ERAZO		→ NO
6	1 131	3189	1	11	998	CENTRO DE CARDIOLOGIA	LOS RIOS		22
5	3 132	3192	1	66	998	CENTRO MED. SAN RAFAEL	MEXICO, HERRERA		5
5	7 133	3193	2	10	998	DR. BAEZ	BUENOS AIRES		→ NO
5	3 134	3194	1	83	998	CENTRO MED. DIVINO PASTOR	OSCAR SANTANA, GUALEY		→
5	3 135	3195	1	75	998	CLINICA NACIONAL	TTE. AMADO GARCIA, MARIA AUX.		→ 4
5	3 136	3198	1	66	45	DR. DINZEY	DR. DELGADO		10
5	7 137	3199	1	74	998	DR.PENA	CALLE 17, ENS. LUPERON		→ NC
5	3 138	3200	1	63	998	MEJIA GUERRA	TUNTI CACERES		6
3	1 139	3201	2	4	998	SAN ISIDRO	SAN ISIDRO		→ NO
5	3 140	3202	1	98	998	DR. ANT. CRUZ JIMINIAN	ORTEGA Y GASSET		42
5	7 141	3203	1	63	998	DR. GARCIA	AMERICO LUGO		→ NO
5	3 142	3204	1	70	998	DR. MATEO SILVESTRE	CALLE 34 #30, LUPERON		16
5	3 143	3205	1	70	998	DR. FERNANDEZ	P. LIVIO CEDENO		→ 16
5	7 144	3207	1	70	998	CORAZON DE JESUS	JOSE FABRIA		→
5	3 145	3208	1	98	998	CARLOS APONTE	AV. OVANDO #496		14
5	7 146	3210	1	75	998	MA. AUXILIADORA	AV. DUARTE, MARIA AUXILIADORA		12
5	3 147	3211	1	63	998	SANTO DOMINGO	MOCA #113		→ 6
5	3 148	3214	1	58	998	SAN MISUEL	JUAN A. IBARRA		5
5	3 149	3216	1	63	998	CANDELARIA	SAN MARTIN, VILLA JUANA		NO
5	7 150	3219	1	76	998	DRA. ANA MARIA	FEDERICO VELAZQUEZ		→
5	3 151	3220	1	98	998	CRISTO REY	PROL6. OVANDO #422		NO
5	7 152	3223	1	5	998	DR. MEDINA	LAS PALMAS		5
5	3 153	3224	1	37	998	LANDESTOY	MEXICO, B.A. HERRERA		→
5	3 154	3225	1	3	998	NORMALITA	BAYONA, ENGOMBE		6
5	7 155	3226	1	15	998	DRA. CAROLINA	CALLE IRA., HERRERA		14
5	3 156	3227	1	5	998	MARTINEZ TORRES	LAS PALMAS		→ ESTE)
5	3 157	3228	1	5	998	LAS COLINAS	LAS PALMAS		16
5	3 158	3229	1	80	998	VILLA DUARTE	OLESARIO, V. DUARTE		15
5	3 159	3230	1	5	998	CENTRO MED. LAS CAOBAS	LAS CAOBAS		9
5	7 160	3231	1	77	998	SANTA LUCIA	VILLA FRANCISCA		→ 11
									→ 9

2	6 441	6071	1	17	998	ZONA F DE SANTO DOMINGO	ZONA IND. DE HERRERA
2	6 442	6072	1	31	998	ZONA G (PARAISO) DE SANTO DOMINGO	ENS. PARAISO
2	8 443	6073	1	56	998	ACCIDENTE DE TRABAJO EN SANTO DGO.	A. FLEMING
2	6 444	6074	2	1	998	BOCA CHICA EN SANTO DOMINGO	BOCA CHICA
2	7 445	7075	2	14	998	LA ESTRELLA	VILLA MELLA
4	7 446	7076	2	11	998	PALAVE	MANOGUAYABO
4	7 447	7077	2	12	998	LA CEIBA	SAN LUIS
2	7 448	7078	2	1	998	FACTORIA HATO NUEVO	BOCA CHICA
2	7 449	7079	2	10	998	LOS ALCARRIZOS	LOS ALCARRIZOS
2	7 450	7080	1	56	998	OFICINA CENTRAL	LA FE
2	7 451	7081	1	48	998	CERVECERIA NACIONAL DOMINICANA	30 DE MAYO
2	7 452	7082	2	12	998	SAN LUIS	SAN LUIS
2	7 453	7083	1	58	998	SOCIEDAD INDUSTRIAL DOMINICANA	CRISTO REY
2	7 454	7084	1	50	998	CORPORACION DOM. DE ELECTRICIDAD	CENTRO DE LOS HEROES
2	6 455	7085	1	80	998	MOLINOS DOMINICANOS	VILLA DUARTE
2	7 456	7086	1	42	998	HOTEL EMBAJADOR	BELLA VISTA
2	7 457	7087	2	4	998	GUERRA	GUERRA
4	7 458	7088	2	1	998	AEROPUERTO	BOCA CHICA
4	7 459	7089	2	4	998	MATA MAMON	GUERRA
4	7 460	7091	2	9	998	LA VICTORIA	LA VICTORIA
2	7 461	7092	2	1	998	LA LUISA	BOCA CHICA

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ANNEX 4

HOJA DE COTEJO DE MATERIALES Y EQUIPO

NECESARIO PARA EPIDEMIAS DE DENGUE HEMORRAGICO

INSTITUCION : _____

DIRECCION : _____

NUMERO DE CAMAS : _____ NUMERO DE MEDICOS : _____

NUMERO DE ENFERMERAS : _____ *POBLACION SERVIDA : _____

FACILIDAD	LISTADO DE EQUIPO Y MATERIALES	CANTIDAD REQUERIDA POR 10,000 POBLACION	CANTIDAD NECESARIA POR *	CANTIDAD EN EXISTENCIA
HOSPITAL REGIONAL / HOSPITAL DE AREA / CENTRO DE DIAGNOSTICO Y TRATAMIENTO	MANILLAS DE PRESION SANGUINEA			
	TERMOMETROS			
	VACUTAINERS			
	JERINGILLAS			
	AGUJAS			
	TUBOS DE TAPA ROJA			
	HOJAS DE NOTIFICACION			
	ACETAMINOFEN			
	AGUJAS Y TUBOS DE SUERO			
	NORMAL SALINA (LITROS)			
	D S N S (LITROS)			
HOSPITAL REGIONAL / HOSPITAL DE AREA	LANCETAS			
	TUBOS CAPILARES (CRIT.)			
	INDICADORES			
	CENTRIFUGAS			
	MICROSCOPIO COMPUESTO			
	LAMINILLAS			
	TINTE (WBC , PLAQUETAS)			
	MAQUINA PARA CBC			
	RECORD MEDICO GRAFICO			
HOSPITAL REGIONAL	BANCO DE SANGRE			
	GASES ARTERIALES Y pH			
	ELECTROLITOS			
	RAYOS X PORTATIL			
	C V P			
	SWAN-GANZ CATH.			
	DEXTROSA 50			
	VOLUME EXPANDERS			
	WHOLE BLOOD			

NOMBRE _____ FIRMA _____ FECHA _____

ANNEX 4

HOJA DE COTEJO DE MATERIALES Y EQUIPO

NECESARIO PARA EPIDEMIAS DE DENGUE HEMORRAGICO

INSTITUCION : _____

DIRECCION : _____

NUMERO DE CAMAS : _____ NUMERO DE MEDICOS : _____

NUMERO DE ENFERMERAS : _____ *POBLACION SERVIDA : _____

FACILIDAD	LISTADO DE EQUIPO Y MATERIALES	CANTIDAD		
		REQUERIDA POR 10,000 POBLACION	NECESARIA POR *	EN EXISTENCIA
HOSPITAL REGIONAL / HOSPITAL DE AREA / CENTRO DE DIAGNOSTICO Y TRATAMIENTO	MANILLAS DE PRESION SANGUINEA			
	TERMOMETROS			
	VACUTAINERS			
	JERINGILLAS			
	AGUJAS			
	TUBOS DE TAPA ROJA			
	HOJAS DE NOTIFICACION			
	ACETAMINOFEN			
	AGUJAS TUBOS DE SUERO			
	NORMAL SALINA (LITROS)			
	D S N S (LITROS)			
	LANCETAS			
	TUBOS CAPILARES (CRIT.)			
	INDICADORES			
	CENTRIFUGAS			
	MICROSCOPIO COMPUESTO			
	LAMINILLAS			
	TINTE (WBC , PLAQUETAS)			
	MAQUINA PARA CBC			
	RECORD MEDICO GRAFICO			
	BANCO DE SANGRE			
	GASES ARTERIALES Y pH			
	ELECTROLITOS			
	RAYOS X PORTATIL			
	C V P			
	SWAN-GANZ CATH.			
	DEXTROSA 50			
	VOLUME EXPANDERS			
	WHOLE BLOOD			

END

NOMBRE _____ FIRMA _____ FECHA _____