



ENVIRONMENTAL HEALTH PROJECT

ACTIVITY REPORT

No. 9

Towards a Functional Vector-borne Disease
Research and Training Center
in the Endemic Terai, Nepal:
Technical Assistance 1994-95

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by
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LIST OF ACRONYMS

CDC	Centers for Disease Control and Prevention, Atlanta, Georgia, and Fort Collins, Colorado
DAT	direct agglutination test
EDCD	Epidemiology and Disease Control Division, Ministry of Health, Nepal
EHP	Environmental Health Project, sponsored by USAID
EIS	epidemiologic information system
IFAs	immunofluorescent antibody assays
JSI	John Snow, Inc.
LAT	latex agglutination test
MOH	Ministry of Health
MRTC	Malaria Research and Training Center, established 1979
PCR	polymerase chain reaction
PCV	Peace Corps Volunteer
TOT	training of trainers
TDR	UNDP/WHO/World Bank-sponsored Tropical Disease Research Program
UNDP	UN Development Program
USAID	U.S. Agency for International Development
VBC	Vector Biology and Control Project, sponsored by USAID
VBDC	Vector-borne Disease Center (proposed and accepted new name for MRTC)
VCA	vector control assistant
VSO	volunteer service organization
WHO	World Health Organization
WRAIR	Walter Reed Army Institute of Research, Washington, DC

NEPAL: SUMMARY REPORT

EXECUTIVE SUMMARY

Vector-borne diseases such as malaria, visceral leishmaniasis (or kala-azar), Japanese encephalitis, and filariasis have been important public health problems in Nepal for many years.. To begin to address these issues, the government of Nepal, with support from USAID, established the Malaria Research and Training Center (MRTC) in Hetauda in 1979. The purpose of the center was to train personnel and to conduct and strengthen Nepal's research capability in detecting and preventing vector-borne diseases, particularly malaria.

With the implementation of the Ministry of Health's integration plan in 1993 a great number of staff from district public health offices and health posts needed to be trained in malaria control to provide them with the skills required to carry out routine malaria control activities in their respective areas. However, MRTC's physical and laboratory facilities were inadequate to train the required staff adequately and efficiently. Following a joint WHO/USAID/Government of Nepal assessment of the national malaria program¹, USAID/Nepal agreed to assist His Majesty's Government of Nepal/Epidemiology and Disease Control Division (EDCD) in expanding and upgrading the MRTC's physical facilities and augmenting its training capability, including improved laboratory facilities and an insectary, to meet current and future training and research needs.

In 1994, USAID/Nepal requested technical assistance from the Environmental Health Project (EHP) to ensure the successful start-up of activities at the newly refurbished center. It was suggested by EHP and agreed (by the MOH and USAID Nepal) that the center would be called the Vector-Borne Disease Center (VBDC). During 1994-95, EHP provided assistance in installing laboratory

equipment and training staff in its use, establishing diagnostic technologies, and conducting team-building and training-of-trainers-workshops. In addition, EHP, with authorization from the Office of Health and Nutrition, undertook a concurrent, core-funded activity to provide a long-term local consultant to support VBDC and fund the participation of the EHP program director for tropical diseases in collaboration with VBDC. The purpose of these various activities was to enable VBDC to cope more effectively with vector-borne disease outbreaks, particularly the kala-azar epidemic that is emerging as a critical public health problem in Nepal. This report summarizes the three major activities/interventions that were undertaken by EHP to help establish the VBDC as a functional institution within the framework of the Ministry of Health.

During the first quarter of 1995, VBDC received technical assistance from a long-term consultant on site and (on short-term visits) from a biomedical scientist, epidemiologist, and training specialist to install the new laboratory facilities, conduct a training-of-trainers (TOT) workshop for key staff, and begin the development of an epidemiologic surveillance system. Concurrently, VBDC has been receiving training support from WHO and research support from the UNDP/World Bank/WHO special program for research and training in tropical diseases (TDR). Further collaboration is being proposed by such international institutions as the Centers for Disease Control and Prevention (Division of Vector-borne Infectious Diseases) and Walter Reed Army Institute of Research (WRAIR).

¹See VBC Project. 1994. *An External Assessment of the Malaria Control Program in Nepal, March 13-29, 1994*. Arlington, Va.: VBC Project. VBC Report no. 82201. Available on request from the Environmental Health Project.

The EHP team believes that VBDC has the potential to be a leading center for research and training in vector-borne diseases, as well as in the effective surveillance, control, and prevention of these diseases. As the center develops the critical core of personnel to become fully operational, assignment of Peace Corps Volunteers (PCVs) to the center will be extremely useful. These PCVs can facilitate significant technology transfer and greatly assist in all activities, including those currently being proposed by the World Health Organization. (WHO has recently become an important source of support in terms of research and training.)

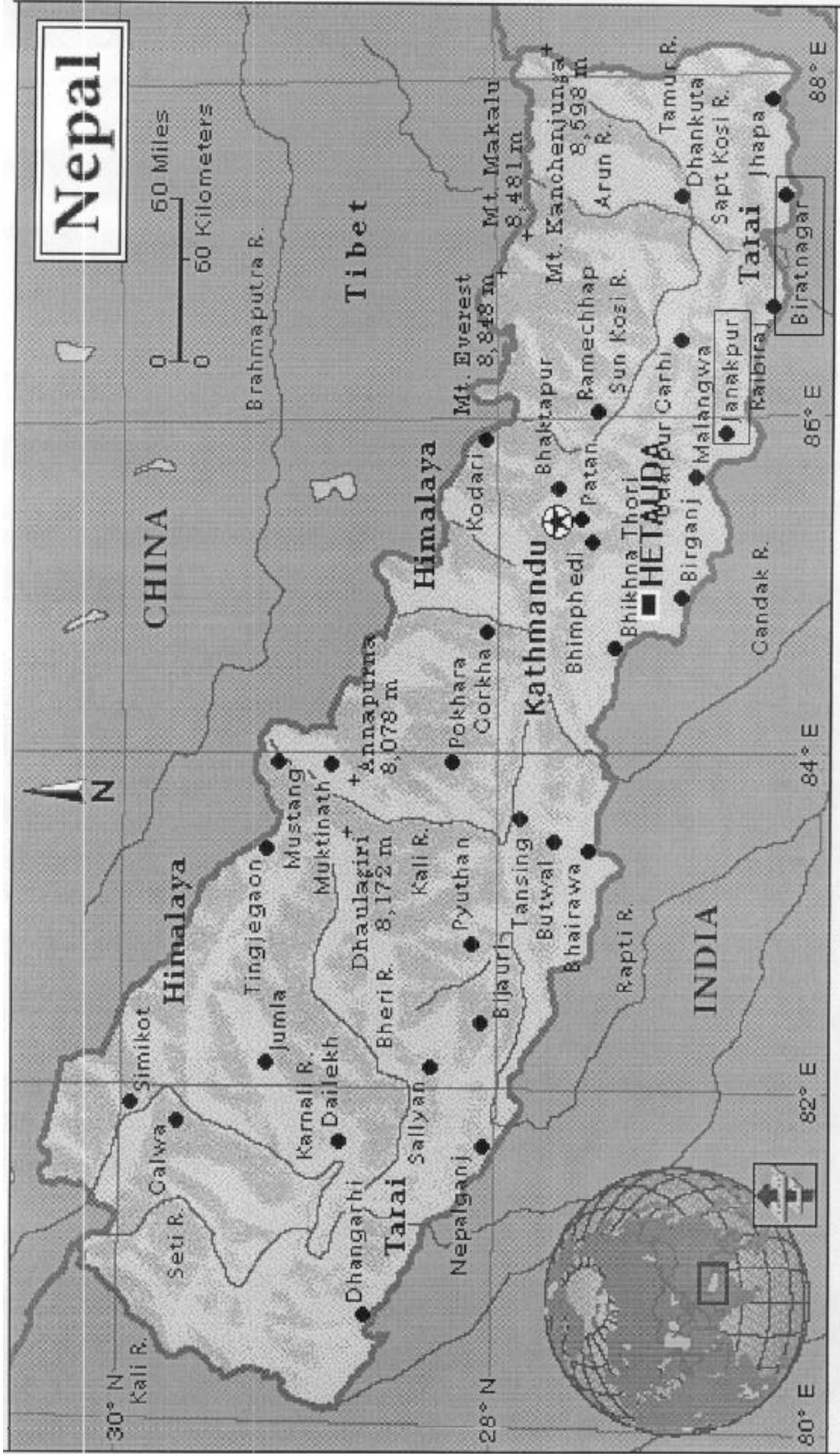
VBDC now has excellent facilities for training, workshops, and conferences and should be fully utilized toward this end. Local and international nongovernmental organizations, and organizations such as the U.S. Peace Corps, should be encouraged to utilize the facilities. A system should be developed so that the income from such activities is placed in a revolving fund for the maintenance of VBDC.

With recent investments to upgrade its human and technical resources, VBDC will have the local capacity and appropriate tools to monitor future

outbreaks of emerging/re-emerging regional vector-borne diseases such as malaria, Japanese encephalitis, dengue hemorrhagic fever, and plague. The center has benefitted from the environmental health approach of EHP in preparing for operational research to examine disease mechanisms and patterns at the community level. The center is also well positioned to harness regional collaboration on surveillance with neighboring countries.

While VBDC has strong potential to serve as a national and regional research center for research and epidemiological surveillance, it will not be able to function properly without financial and personnel support until a continuous source of external grant funding can be obtained. Short-term financial support should include an annual operating budget for the next three to five years as well as one-time expenditures for additional equipment for training and research. For its financial well-being in the future, the center needs to develop a business plan to facilitate a systematic program of income-generating activities, including research grants, conference services, and diverse other activities.

Nepal



1 BACKGROUND AND OVERVIEW

His Majesty's Government of Nepal, with the assistance of the World Health Organization (WHO) and the U.S. Agency for International Development (USAID), carried out an external assessment of the Malaria Control Program in Nepal March 13-29, 1994. Based on that assessment, it was discovered that, although the malaria situation had generally improved in Nepal since 1992, vector-borne diseases continued to be important public health problems. Instances of visceral leishmaniasis (kala-azar) are on the rise. Since 1980, there have been over 4,500 cases of kala-azar and more than 166 reported deaths. The incidence is dramatically increasing, and it is believed that the number of cases is under-reported several-fold. Nepal has one of the highest kala-azar case-fatality rates in Asia. In addition, Japanese encephalitis is also characterized by high case-fatality rates. Since 1978, the Division of Epidemiology of the Ministry of Health (MOH) has reported an average of 500 to 700 cases per year. Dengue fever and filariasis could become serious problems as well. (Appendix A presents maps illustrating the areas of Nepal most affected by malaria, kala-azar, and Japanese encephalitis.)

There has been a long history of joint efforts to alleviate the disease burden in Nepal, with the U.S. Government being a significant participant. The Department of Health Services in the Ministry of Health has received support from the U.S. Government for many years. Peace Corps Volunteers (PCVs) were provided during the inception of the USAID-supported Integrated Community Health Services Development Program in 1981, and PCV medical technologists were placed under a program with the Central Health Laboratories for assignment at health facilities throughout Nepal. Over the past 40 years, the malaria program in Nepal has received significant support from USAID, launching one of the most successful efforts of its kind. Specifically, through USAID support, His Majesty's Government of

Nepal established the Malaria Research and Training Center (MRTC) in Hetauda in 1979. (In 1993, the center was placed under the newly formed Epidemiology and Disease Control Division or EDCD.) The purpose of the center was to provide better training for personnel and to strengthen its research capability in detecting and preventing vector-borne diseases, particularly malaria.

An assessment of the malaria program in Nepal was conducted in March 1994 by the USAID-sponsored Vector Biology and Control (VBC) Project.² The assessment found that there was an urgent need for the formation of a task force to develop a national strategy for the prevention, control, and monitoring of kala-azar and other vector-borne diseases in addition to malaria. MOH gave kala-azar the highest priority during its 1994 joint WHO/USAID evaluation of Nepal's vector-borne disease control program. Training and research activities needed to reflect this priority. As a result, it was recommended that VBDC be fully staffed, equipped, and put into active use for training and operational research as soon as possible.

To assist in strengthening the center's capabilities, USAID/Nepal requested technical assistance from the Environmental Health Project (EHP) to ensure successful start-up of activities at the newly refurbished center. (In addition to funding from USAID/Nepal, EHP, with authorization from the Office of Health and Nutrition, conducted a concurrent, core-funded activity to support the broader mandate for the center.) Appendix B contains the scopes of work for these two USAID activities.

²See VBC Project. 1994. *An External Assessment of the Malaria Control Program in Nepal, March 13-29, 1994*. Arlington, Va.: VBC Project. VBC Report no. 82201. Available on request from the Environmental Health Project.

Concurrently, VBDC has been receiving training support from WHO and research support from the UNDP/World Bank/WHO special program for Tropical Disease Research (TDR). Further collaboration is being proposed by such international institutions as the Centers for Disease Control and Prevention (Division of Vector-borne Infectious Diseases) and Walter Reed Army Institute of Research (WRAIR).

The newly constructed and furnished complex has great potential to serve as a national and regional

research and training resource. As part of the Eighth Plan (1992-97) of His Majesty's Government of Nepal, a major restructuring of MOH is being implemented. According to the new reorganization, a total of 20 posts, including technical, administrative, and support staff, have been established. Key personnel at the Hetauda center include the chief epidemiologist, laboratory section head (parasitologist), insectary section head (entomologist), and vector control officer. The center's staff is complemented by 16 technical and administrative support staff.

2 USAID/EHP ACTIVITY

2.1 Initial Assessment

To review and assess the current status and needs of the center, Panduka Wijeyaratne, EHP's tropical disease specialist (and technical manager for this activity) made a trip to Nepal in December 1994. (See Appendix C for a list of individuals contacted.) During his visit, Dr. Wijeyaratne met with ministry officials and local EHP consultants. They discussed the staffing situation at VBDC and the possibility of support for its activities. Dr. Wijeyaratne determined that, if the center is to function well, a core of 14 more staff would be required.

His recommendations included

- ! providing a local consultant for a 12-month period to assist the VBDC's director in establishing a work plan and to assist staff in organizing and conducting training and research activities
- ! establishing laboratory diagnostic capacity for kala-azar and Japanese encephalitis in particular
- ! orienting staff to the new center and providing TOT;
- ! establishing epidemiological surveillance capacity in VBDC
- ! recruiting a social scientist at the center for expanding the scope and relevance of research and training
- ! establishing linkages with the community by providing appropriate services.

During his meetings, it was also agreed that the center's name should officially be changed from

Malaria Research and Training Center to the Vector-borne Disease Center (VBDC) to reflect more accurately the center's expanded scope.³ The center's mission statement reflects the new approach: "To provide support to the Ministry of Health's Division of Epidemiology (now EDCD) through multidisciplinary research and training including community, environmental, and biomedical aspects, for the prevention and control of vector-borne diseases in Nepal."

EHP activities in the first half of 1995 consisted of support for four of the components mentioned above: (a) providing a long-term consultant in Nepal, (b) laboratory set-up and training, (c) staff orientation training and TOT workshop, and (d) initiation of an epidemiological surveillance system.

2.2 Long-term Consultant

A long-term consultant, Mr. Shreedhar P. Pradhan, was hired to assist the center's Director in development of an annual work plan, with particular regard to the newly adopted integrated epidemiologic approach of the Division of Epidemiology for vector-borne disease control in Nepal. Mr. Pradhan also assisted the center's staff in setting up training courses in medical entomology and vector-borne disease, with an emphasis on kala-azar and Japanese encephalitis, in addition to malaria. Mr. Pradhan's services have been engaged in all four of the areas noted above for EHP-supported activities. He has been a liaison for the center with various important agencies (WHO, USAID, John Snow, Inc., and others) involved in strengthening the center and

³The name change has been approved but, as of June 1995, has not yet officially been inaugurated.

its services to MOH. In all, his support to the Director has been both on internal operations and liaison functions outside the center.

The performance of the local consultant on all aspects of his job has been fully satisfactory. His monthly reports (via the Director, to EHP) have been prompt and informative.

2.3 Initial Laboratory Set-up

Following Dr. Wijeyaratne's visit, EHP sent a consultant, Robert A. Wirtz (a medical entomologist attached to Walter Reed Army Institute of Research), to assist with installation of new equipment. Dr. Wirtz visited the center February 5-18, 1995. He helped set up new laboratory equipment and trained staff to conduct specific diagnostic immunoassays for identification and control of vector-borne diseases. He also helped identify sources for collaborative research between VBDC scientists and laboratories in other countries. As of summer 1995, Dr. Wirtz continues to provide advice and information through correspondence with staff at VBDC.

During Dr. Wirtz's February visit, an inventory list of equipment and supplies that had arrived, compiled by VBDC personnel, was checked and found to be accurate. All new equipment on site, with the exception of the thermal cycler, was set up, calibrated as needed, and tested. One small centrifuge was defective and had to be returned for a replacement. Two block heaters and a grinder were designed for 110-voltage and were exchanged for 220-volt models. The grinder was carried back to Washington, D.C., and arrangements were made to have a 220-volt model shipped to Hetauda.

Major equipment that had not arrived at the time of Dr. Wirtz's visit included the computers, printers, software, fax machine, humidifier, pH meter, balance, centrifuges, vacuum pumps, a liquid

nitrogen storage system, and an autoclave. Since this equipment was not available to be set up and tested, it was impossible to conduct some of the training as planned and modifications to standard protocols were required.

Some equipment that had arrived required 120 volts (i.e., fluorescent power supply, microliter plate reader, mosquito grinder, block heaters, and a balance) or electrical plug adapters that were not available in Hetauda. Step-down transformer-surge suppressors and plug adapters had to be purchased in Kathmandu. The offices of John Snow, Inc. in Nepal were very helpful in procuring and transporting the transformers and adapters, but not having earlier use of these items significantly reduced the training that could be conducted.

Dr. Wirtz conducted training on the use of the equipment available and identified protocols for recalibration and maintenance. This consisted primarily of reviewing relevant sections in the equipment manuals. Training was conducted on a daily basis to maximize hands-on use of equipment and to develop trainee confidence.

2.4 Training

Tara S. Upreti, a specialist in public health training, visited Nepal to enhance the VBDC's staff's capability in teamwork and train those staff involved in training other VBDC staff and general health personnel. Two 6-day workshops were conducted for this purpose -- an orientation workshop on team building and a training-of-trainers (TOT) workshop. Objectives for these workshops were to have the center staff work as a team and to strengthen the training capacity of the training personnel. From March 26 to 31, 1995, EHP consultants conducted the workshop on team building for all staff and for the purpose of developing a draft operational manual. The TOT workshop, which was held from April 2-7, 1995, was intended for those center staff involved in training as well as a number of other trainers associated with district and regional malaria offices located at Hetauda.

Dr. Upreti and three local consultants were engaged to assist with these start-up activities. Three EHP consultants and one WHO advisor conducted the orientation workshop. A total of 17 VBDC staff participated. Ten of the participants were technical and administrative, and seven were support staff. Technical and administrative personnel attended all of the six-day sessions, and the support staff attended the team work and team building, interpersonal communication, and resource management sessions.

The first objective of this workshop was to review the goal, organizational structure, and functions of VBDC. The second objective was to review each team member's job description. Job descriptions available for review were scanty and incomplete. Therefore a significant amount of time was spent preparing a first draft of job descriptions for all categories of staff. This activity continued for three days in small and large groups. Between sessions, other topics were covered such as team work, communication, and resource management.

The orientation workshop laid the foundation for developing an operational manual for the center and produced the following:

- ! a descriptive statement of VBDC's structure and function
- ! an organizational chart and staffing patterns that use the team approach
- ! a first draft of job descriptions for all staff
- ! a training and research plan for 1995-96
- ! guidelines for use by VBDC staff and others
- ! a list of furnishings and equipment

Four EHP consultants (including three recruited locally) conducted the TOT workshop. This workshop introduced the 12 participants to an experiential style of training. During this workshop, the topics of presentation and facilitation were covered along with observation and feedback skills. To a limited degree, participants were given opportunities to practice some of the training methods through discussion, exercises, and assigned reading and through observation and feedback. The job descriptions of the training officer and trainers and the responsibilities of trainees were reviewed and modified.

The TOT workshop also provided an opportunity to develop a detailed job description of the vector control assistant (VCA). Based on this job description, essential training material was identified and a plan developed. This exercise was completed after the workshop.

The main constraints of this workshop were the limited time available and the newness of this process for all concerned. Although the TOT workshop only partially met its objectives, it did produce the following results:

- ! Twelve trainers in Hetauda, including four full-time staff members plus one PCV at VBDC, have been introduced to the interactive and participatory style of training.
- ! Job descriptions for the training officer, trainers, and VCA have been developed.
- ! Training material and a training plan have been identified for the VCA.

- ! Training plans have been structured for introductory sessions; required essential resources and appropriate methods for effective training have been identified, discussed, and agreed upon.

The consultants found the VBDC staff to be working well as a team. This was evident during the second week where staff were sharing each other's duties.

2.5 Epidemiologic Surveillance

Charles W. Oliver, a senior technical advisor from USAID's Office of Health and Nutrition, traveled to Nepal February 12 to 21, 1995, to develop, in coordination with the VBDC director and chief epidemiologist, a framework for an epidemiologic surveillance system as a national strategy for the prevention, control, and monitoring of vector-borne diseases.

It appeared unrealistic to set up a full-scale epidemiologic surveillance system nationwide with the limited amount of technical assistance (TA) available. Thus, it was agreed that the epidemiologist explore local options for strengthening the center's long-term capacity to conduct epidemiologic surveillance at nearby health centers and, if possible, in at least one sentinel site. Subsequently, two sites were selected: the zonal hospital in Janakpur, Dhanusha, and the district hospital in Biratnagar, Morang District. These centers were selected for the following reasons:

- ! geographic location in terms of presence of at least two of the four diseases (particularly malaria, Japanese encephalitis, and kala-azar)
- ! adequacy and interest of medical laboratory and human resources

- ! proximity to the Indian border where population movements affect the spread of disease.

The sentinel sites provide data on laboratory results and cases. VBDC will computerize the data and report it to MOH/Kathmandu. Hopefully, the two sentinel sites will be augmented when additional sites can be identified.

The U.S. Peace Corps placed an epidemiologist at the center in April 1995. Discussions are still in process regarding the placement of a medical microbiologist. Also, UNICEF/Nepal and WHO/Nepal have expressed serious interest in collaboration with the center, both in terms of surveillance and research.

Dr. Oliver developed and programmed an epidemiologic information system (EIS) in coordination with the director of VBDC. The system focuses on kala-azar, a priority disease in Nepal, and includes modules for both monthly sentinel site reports and individual case referral reports. The medical directors of the two health facilities have expressed their commitment to this initiative.

Essential new features of the EIS are new laboratory diagnostic technologies for rapid (and sensitive) confirmation of suspected cases of kala-azar. This new diagnostic capacity includes enzyme linked immunosorbent assay, indirect fluorescent antibody test, and in the future, polymerase chain reaction (PCR) -- the first time this highly sensitive DNA-based technology has been introduced in Nepal. Also, Dr. Wijeyaratne is exploring, in coordination with other WHO-sponsored research at VBDC, the development of a rapid field latex agglutination test (LAT) and a rapid colorimetric dipstick assay, such as the one being developed by the Biomedical Research Center of WRAIR, which could greatly facilitate preliminary diagnostic confirmation at the

sentinel sites. Diagnosis of kala-azar in Nepal has been limited to crude clinical diagnosis, an aldehyde test lacking sensitivity, and an invasive parasite isolation procedure requiring either a painful bone marrow puncture or splenic aspirate.

2.6 Additional Accomplishments

In addition to setting up equipment, providing training, and initiating a surveillance system, the consultants accomplished the following:

- ! identified demonstration assays for exhibit at the official VBDC inauguration;
- ! provided an initial supply of reagents for detection of human antibody to kala-azar and malaria parasites, and provided malaria-infected mosquitoes;
- ! established storage requirements for reagents;
- ! gave formal lectures on the theory, development, and use of immunologic and molecular methods for detection of vector-borne pathogens in arthropods and humans; and
- ! established laboratory safety procedures.

3 FOLLOW-UP ACTIVITY AND RECOMMENDATIONS

If the main objective is to be achieved (providing support to the MOH's EDCD through multidisciplinary research and training for the prevention and control of vector-borne diseases throughout Nepal), various issues still need to be addressed.

The financial status of His Majesty's Government of Nepal is weak, and with the new government just settling in, it is unlikely that VBDC will draw higher priority than other critically needed health care areas. However, it is imperative that the message about *prevention* of vector-borne diseases be continuously reinforced and the financial commitment to the Vector-borne Disease Center be maintained or gradually increased. The cost of epidemic control, case management, and secondary and tertiary care for kala-azar, Japanese encephalitis, and *P-falciparum* malaria is substantially higher than prevention; the prevalence of these diseases poses a major impediment to development, especially in the agricultural Terai region. Minimal external funding assistance as well as some measures toward cost replenishment (such as rental of training and dormitory facilities and research and institutional strengthening grants) would help sustain the center into the future. In the near term, continuous encouragement and minimal funding support for selected activities may be indicated.

International researchers with supportive funds could be attracted to the center in the spirit of providing a stimulus and as resource persons. Since the vector-borne diseases facing Nepal are also regional problems with increasing endemicity, it is important to encourage regional perspectives and collaboration, including regional meetings or workshops whenever possible.

3.1 Personnel Issues

There still remains the need for a social scientist/health educator position at VBDC. All consultants and advisors in the year-long assistance activity have reiterated this recommendation. Ideally, an additional individual would be required to coordinate grant applications, monitor equipment and supply orders, and coordinate field studies. The most compelling reason to establish such a position is that it could greatly facilitate the process of acquiring research grants from international donor organizations, the majority of which require the presence of such a position. The duties of the latter position are currently being performed by Mr. Shreedhar P. Pradhan, the long-term consultant hired by EHP.

The long-term consultant has proven to be an effective liaison for VBDC, MOH, and USAID/Nepal. USAID/Nepal apparently concurs with this assessment and has set aside funding for fiscal year 1996 toward maintaining the locally-based consultant to provide the continuity needed during this critically important evolutionary period for the center. However, it is important to phase-out any dependence on the consultant and for the center to take on complete technical and management responsibilities.

In addition to the positions mentioned above, it will be essential for the Nepal government to ensure that VBDC is staffed with trained, dedicated personnel. Volunteer service organization (VSO) or Peace Corps personnel with the relevant training

could be instrumental in VBDC achieving its objectives. As such, the government should strive to secure the services of additional trained PCVs or other VSO personnel.

3.2 Laboratory Training

If a PCV/medical microbiologist can be placed at VBDC, that person could receive training in diagnostic technologies at WRAIR. Dr. Robert Wirtz, who provided consulting assistance in February 1995, maintains a fully equipped laboratory at WRAIR; he could arrange for appropriate training. The laboratory technician and entomologist at VBDC would benefit greatly from the training course being proposed at the CDC laboratory in Fort Collins, Colorado. The parasitologist would similarly benefit from training in diagnostic techniques at either the Air Force Research Institute of Medical Sciences or WRAIR. There will undoubtedly be an opportunity for additional technical training for the PCVs and their counterparts, since such joint training is part of Peace Corps policy.

Another recommendation regarding lab training for personnel is to invite Dr. V. L. Gurubacharya to VBDC to present the results of a WHO-funded study evaluating the use of the direct agglutination test (DAT) for the serodiagnosis of kala-azar in Nepal. He should also be offered the use of the center's new fluorescent microscope to conduct immunofluorescent antibody assays on selected sera evaluated in the study. This would help establish a working relationship between the National Public Health Laboratory in Kathmandu and VBDC and possibly lead to the development of a grant to continue evaluation of improved serodiagnostic methods.

3.3 Training Capability

Dr. Upreti, the EHP consultant who provided the two training workshops, found the experience proved beneficial for the training team. The team at VBDC was introduced to the participatory and interactive approach of training and to the principle of developing job-specific training material. With this newly acquired knowledge and skill, training will improve in quality. Dr. Upreti recommended that these trainers, who seemed very committed and interested, be afforded other opportunities to participate in additional TOT and curriculum development workshops to strengthen their newly acquired approach.

In short, the staff of VBDC are organized to carry out training activities to some extent. However, to implement training activities to full capacity will require additional support and close supervision and monitoring from the EDCD.

Based on the workshop experience, Dr. Upreti made the following recommendations:

- ! Donor agencies (such as USAID and WHO) should assist the center in completing an operational manual.
- ! Donor agencies also should consider assisting in the completion of the VCA training course manual.
- ! Some technical guidance should be provided to complete the above two activities with local consultants.
- ! Considering the expanded research and training facilities, MOH needs to create additional posts for the center.

- ! A formal process should be put in place to authorize VBDC's initiative to generate supplemental resources by opening the facility to other organizations. This would ensure that the complex is adequately maintained and fully utilized.
- ! VBDC staff need to identify specific areas in training, research, and management in which a PCV can contribute.
- ! The EDCCD should provide additional technical and other essential support to initiate new activities or implement ongoing activities and monitor the activities closely.
- ! The EDCCD should identify specific roles WHO and EHP can play in strengthening the center.
- ! Further assistance should be explored to formulate a plan of action on strengthening the capacity of the center.

3.4 Surveillance

VBDC can be rapidly developed as the channel for epidemiological surveillance for vector-borne diseases in Nepal, with close links to MOH's Epidemiology and Disease Control Division in Kathmandu. The recent installation of computer facilities and the newly functioning telephone link can facilitate such a system. The Director has provided strong support for this role for the center. To make maximum use of the computer capabilities in developing a management information system, it would be beneficial for the EHP to provide technical assistance from a consultant specializing in health-MIS to establish a simple but functional

and useful system. The HMIS will then need to be field-tested, after establishing a sentinel-site type system minimally in two appropriately selected sites.

3.5 Epidemiologic Surveillance Training

The foundation for a functional EIS has been established during the course of this activity, focusing on a simple, user-friendly DOS/EPI-INFO-based system that can be modified and expanded to meet VBDC's evolving needs. A tutorial for EPI-INFO 6.0 has been included in the system and the Director of VBDC given a basic orientation to the system. If donor support can be found, it would be highly desirable for a consultant to provide additional technical assistance to further develop the system to include trend analysis and graphical presentation of data, as well as to assist in developing modules for other vector-borne diseases of high priority and prospective WHO-supported research projects.

In addition, it would be very beneficial for VBDC's chief epidemiologist and the PCV/public health epidemiologist currently assigned to the center to take a short course in epidemiologic surveillance methodology. Such a course is regularly available at the U.S. Centers for Disease Control in Atlanta.

3.6 Research Facility Requirements

Follow-up activities remain to be completed for the research building. Critical equipment in the research building should be connected to the existing 25 KV generator. The initial justification for installation of a generator was to ensure a reliable electrical supply to critical equipment, primarily the air conditioner/heaters and the freezers, the latter of which will hold heat-sensitive reagents and samples from field studies. The loss of untested field samples would make it difficult to comply with grant requirements, making renewal of existing or funding of new grants unlikely.

Currently, the research building is the only building not connected to the generator. If possible, an auto relay switch should be installed on the existing generator to ensure an uninterrupted supply of power during the frequent outages. If an auto relay cannot be installed on the existing generator, consideration should be given to the purchase of a second 5-10 KV generator with auto switch capability wired only to the critical freezers and air conditioners/heaters in the research building.

3.7 Future Projects

Community service linkages and continued support

The laboratory diagnosis/confirmation of kala-azar and Japanese encephalitis in patients is not easy but is essential for the country. This capability does not currently exist in the peripheral health centers and hospitals in the disease endemic zone of Nepal. Health professionals in these institutions should be able to count on VBDC for assistance in this respect as well as in the follow-up and history of cases that show up in the health facilities. VBDC can also provide training to the professionals at the peripheral health facilities, which can serve as active and passive sentinel sites for surveillance purposes. These community linkages can be enhanced by health education programs and the services of an experienced community health/social scientist at VBDC.

The changing patterns, dynamics, ecology, and epidemiology of vector-borne diseases in Nepal call for an applied research program to provide information. Without this information, which can only be generated through research, appropriate prevention or control strategies--including relevant health education and training--cannot be designed. Hence, efforts must continue in assisting VBDC in conducting research. For this to occur, VBDC will need periodic assistance in areas such as writing research proposals, facilitating international contact with research funding agencies, and

promoting international collaboration. WHO (in New Delhi and Geneva) and TDR (in Geneva), as well as U.S.-based organizations such as WRAIR and CDC, would be a start in this respect. Trained researchers from various disciplines in the biomedical and social science areas should also be encouraged to work at the center.

Facility use and business plan

To ensure its financial well-being in the future, the VBDC needs to develop a business plan which includes income-generating activities. Such a plan could include ways to attract research grants, provision of training programs and conference services, and other activities.

VBDC has excellent facilities for training, workshops, and conferences. Local and international nongovernmental organizations and organizations such as the U.S. Peace Corps should be encouraged to utilize the center for such programs. A system should be developed so that the proceeds from such activities could be put into a revolving fund for the maintenance of VBDC. Of course, this will need to be formally approved by MOH/Nepal and the process delineated in the operational manual for VBDC.

Future research projects

The following are being discussed by VBDC and U.S. scientists as possible future research projects:

- ! Develop a capability to culture kala-azar parasites at VBDC. An ability to culture kala-azar parasites would permit production of antigen required for diagnostics tests. The lack of antigen supplies is a major restriction in the development and routine use of these assays. An ability to culture the parasites would also permit studies on strain variation and drug resistance.

- ! Develop a rapid latex agglutination test (LAT) for detection of an antibody to kala-azar and evaluate it against the DAT. Reports in the literature indicate that the LAT can be performed in several minutes, while DAT results are available only after an overnight incubation. Both assays can be performed with minimal equipment and would be based on the same antigen.
- ! To evaluate the sentinel site surveillance system for monitoring regional spread of the vector-borne diseases as well as for its usefulness for the country.
- ! Identify and evaluate methods to reduce kala-azar and Japanese encephalitis transmission, based on selective control of the sand fly vectors and mosquito vectors, respectively.
- ! Determine if differences exist between the mosquito vectors or ribosomal RNA of *Plasmodium vivax* parasites transmitted at high and low altitudes.
- ! Define social, behavioral, demographic, and economic factors related to the spread and transmission of the vector-borne diseases of importance in the region.

Establishing a polymerase chain reaction (PCR) amplification capability at VBDC would require additional staff training, even though the thermal

cycler has been installed. Personnel would need more extensive training to conduct PCR-based studies, and a low-cost, reliable cold chain would have to be established for shipment of reagents from overseas. Resources might be better dedicated to development, evaluation, and use of conventional immunoassays. The more sophisticated molecular techniques can be accessed by collaboration with U.S.-based medical research institutions such as CDC or WRAIR.

3.8 Sustaining the VBDC

It would be useful to develop an article for international publication and a promotional brochure to highlight the efforts of USAID and MOH/Nepal in malaria control over the past 40 years, as well as the prospective capabilities of VBDC. EHP and the USAID/Nepal, Health and Family Planning Division have indicated their support for such publications.

The official name of the center should be formalized as the Vector-borne Disease Center. This change is important to USAID/Nepal as well since the new name conforms with the shift of focus from malaria to all priority vector-borne diseases. Finally, while there has been a reduction in USAID funding support for vector-borne disease control in Nepal, it would be extremely useful for USAID to endorse and support periodic follow-up visits to the center by EHP consultants so that future collaboration with other international donor agencies, such as WHO, can be explored.

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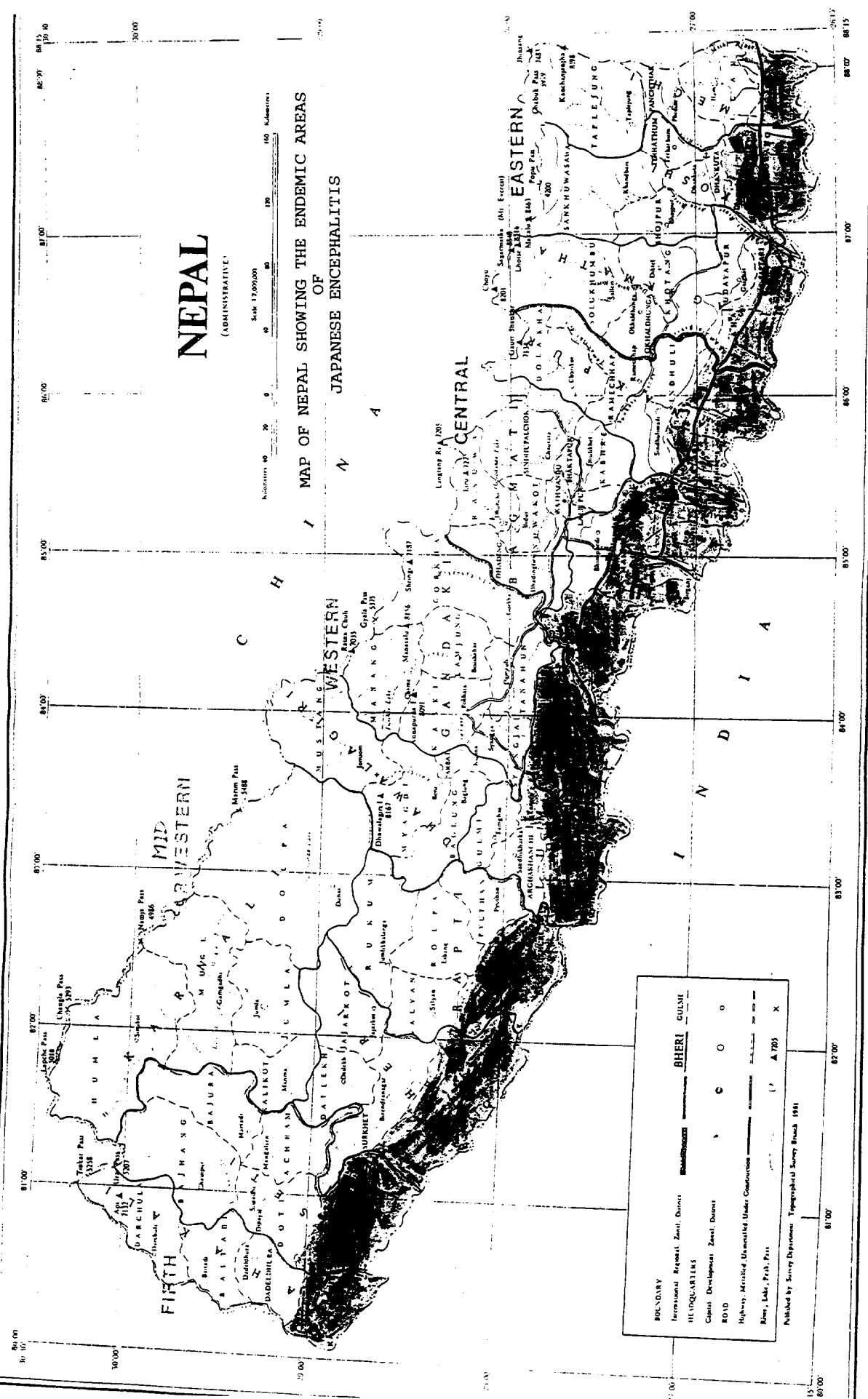
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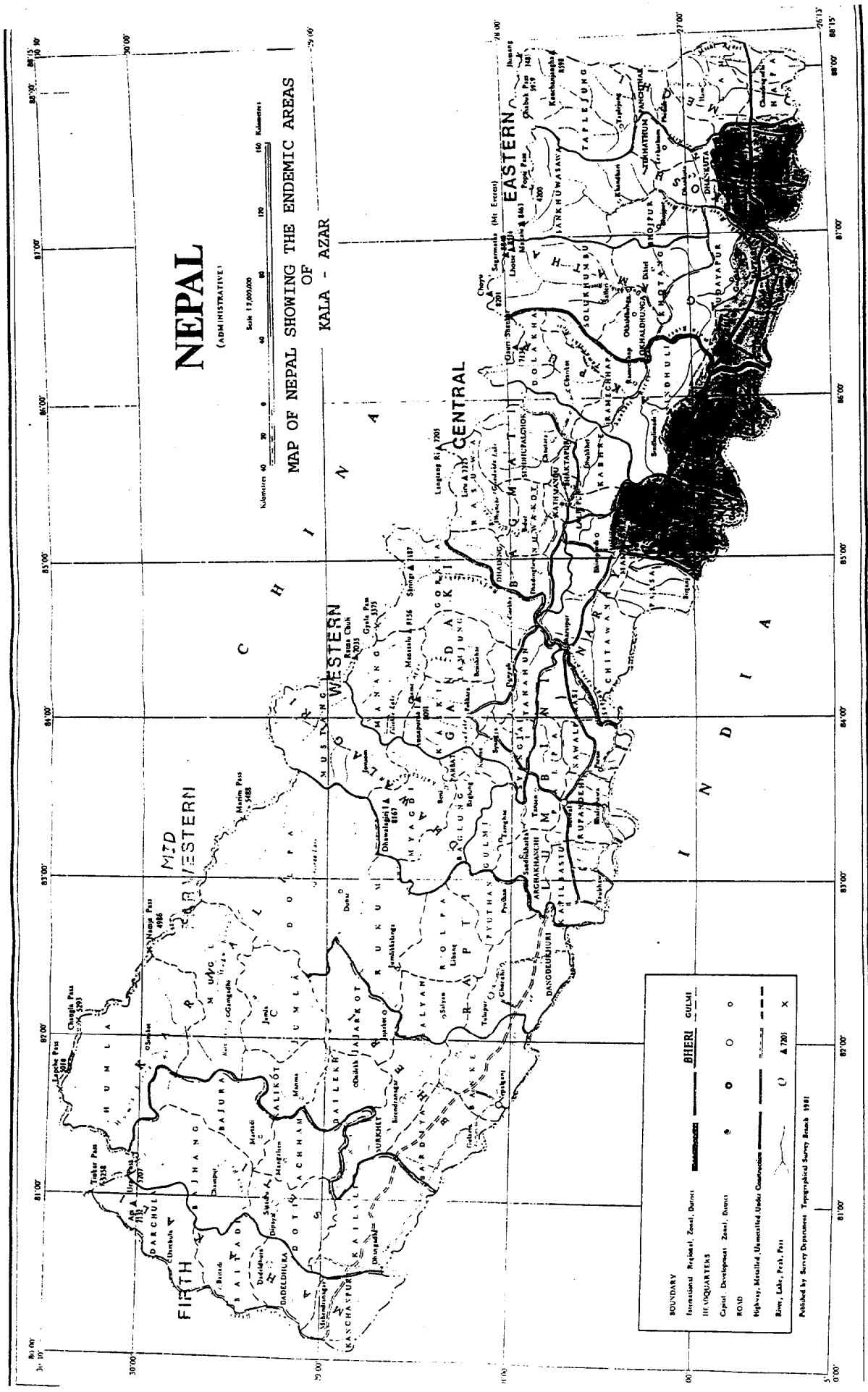
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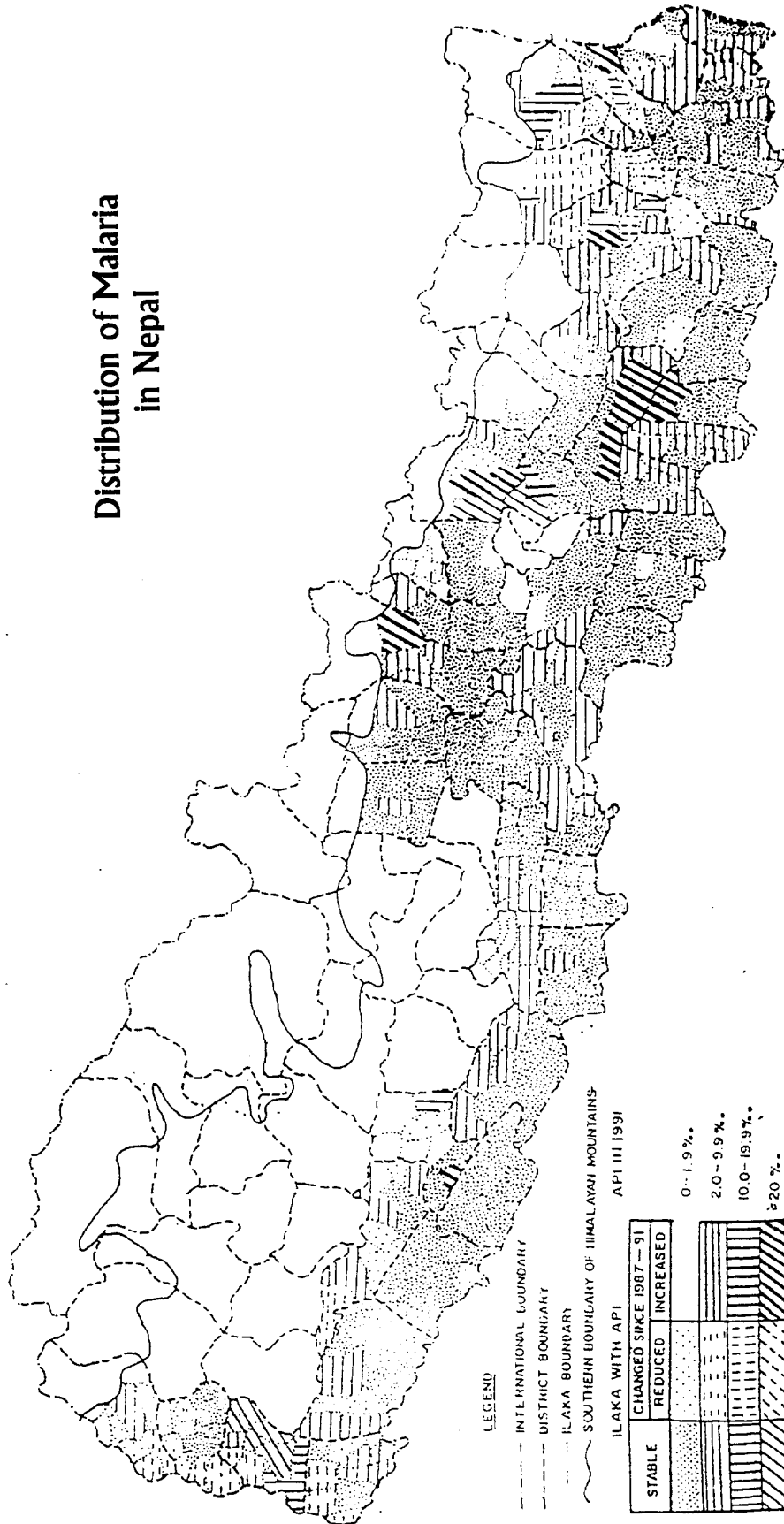
APPENDIX A
DISTRIBUTION OF MALARIA, KALA-AZAR, AND
JAPANESE ENCEPHALITIS



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Distribution of Malaria in Nepal



**APPENDIX B
SCOPES OF WORK**

**NEPAL: TECHNICAL ASSISTANCE TO MALARIA RESEARCH
AND TRAINING CENTER**

REQUIREMENTS CONTRACT

SCOPE OF WORK

BACKGROUND

The Vector-borne diseases, Malaria, Leishmaniasis and Japanese Encephalitis are important public health problems in Nepal. To begin to address these issues, the government of Nepal, with support from USAID, established the Malaria Research and Training Center (MRTC) in Hetauda. With the implementation of the Ministry of Health's integration plan (1987-1988), a great number of staff from District Public Health Offices and Ilaka health posts needed to be trained in malaria control to provide them with the skills required to carry out routine malaria control activities in their respective areas. However, Malaria Research and Training Center's physical facilities (dormitory and classroom) and laboratory facility (space equipment) were inadequate to train the required manpower adequately and in a timely manner. Therefore, USAID/Nepal has agreed to assist His Majesty's Government of Nepal (HMG)/Epidemiology and Disease Control Division (EDCD) to expand and upgrade the MRTC's physical facilities and augment its training capability, including improved laboratory facilities to meet current and future training and research needs.

USAID/Nepal has already provided support for the expansion and improvement of physical facilities (office space, classrooms, laboratory, dormitory, staff quarters) by constructing new buildings, renovating and upgrading old buildings, and improving and equipping the laboratory and insectarium. The upgraded facilities will also enable the MRTC to train the staff required to implement vector-borne disease control activities and carry-out related research activities. USAID/Nepal has now requested technical assistance from EHP to ensure the successful start-up of activities at the newly refurbished center. In addition to the work to be carried out under the buy-in from USAID/Nepal, EHP with authorization from the Office of Health and Nutrition, will conduct a concurrent, core-funded activity to provide a long-term local consultant to support the MRTC, and fund the participation of the EHP Program Director for Tropical Diseases in the collaboration with MRTC. The scope of work for this core-funded activity is attached.

1. OBJECTIVE:

To ensure the successful start-up of the Vector-borne Disease Control Center (MRTC), technical assistance and support is needed to install laboratory equipment, train staff and demonstrate the use of laboratory equipment, establish diagnostic technologies, and assist with training of trainers (TOT). This assistance will enable the MRTC to cope more effectively with vector-borne disease outbreaks, particularly the Kala-Azar epidemic which is emerging as a critical public health problem. In this manner, the Center will demonstrate

the important role it can and must play in supporting the Ministry of Health's vector-borne disease control program.

2. SCOPE OF WORK:

To achieve the above-mentioned objectives, the contractor will provide a laboratory scientist, an expatriate health trainer, and two locally based health trainers to conduct the following tasks:

- a) Work with MRTC staff to set-up laboratory facilities and all technical equipment at Hetauda Center to full operational status.
- b) Calibrate the diagnostic equipment, establish the protocols to be used at the Center (i.e. ELISA and PCR) and train key Hetauda Center personnel on the proper use and maintenance of the equipment and diagnostic protocols. Some of the initial calibration of diagnostic assays will be conducted at Walter Reed Army Institute of Research in USA. Both activities 2(a) and 2(b) will be carried out by a laboratory specialist consultant.
- c) Develop and implement a TOT course and training methods (and Modules for key vector-borne diseases: malaria, Kala-Azar, and Japanese encephalitis) for an integrated training program to be conducted by MOH staff at the district level. This activity will essentially be an implementation of the training modules developed through the VBC Project, during a previous consultancy. This activity will be carried out by the expatriate health trainer and the local trainers.

3. REPORT:

Upon completion of the scope of work (described in items (a) through (c) above), the team will submit a report to the Chief, Office of Health and Family Planning, USAID/Nepal, containing the following:

- a) Executive summary of the major activities completed, i.e. laboratory operation and training of trainers.
- b) Conclusions/recommendations regarding future technical assistance, staff development and other needs of the Center to enable it to fulfill its mandate as the premier vector-borne disease training and research center in Nepal.
- c) The main report, which will contain a detailed description and delineation of activities conducted in each sector, accomplishments, conclusions and recommendations made. Also, it shall include the scope of work, list of individual

participants and a bibliography.

Prior to departing Kathmandu, the draft report will be submitted to the Chief, Office of Health and Family Planning for review. The final report shall be submitted to the MOH/Nepal within 30 days after receipt of mission comments on draft. Five copies of the final report shall be submitted to USAID/Nepal.

4. EXPECTED OUTCOMES

- a) The technical assistance will establish laboratory capacity for diagnosis of Kala-Azar to start with using ELISA tests, and subsequently using the PCR technique. This will also be explored Japanese Encephalitis and, in general, for Malaria.
- b) The technical assistance will also result in enhanced training capability at the MRTC. Continuous training is essential in Nepal and, in particular, at this new center where different groups of field workers on vector-borne disease will, in rotation, be trained to perform their required tasks, in various field activities on prevention/control.

TENTATIVE SCHEDULE:

December 12-20, 1994:	Lab Scientist-Preparation of lab material for MRTC - in U.S.
January 5-6, 1995	Team Planning Meeting
January 6, 1995	Depart for Nepal
January 9, 1995	Brief USAID/Nepal, Travel to Hetauda
January 10-11, 1995	Finalize TOT Design Interview Staff & Participants
January 12 - 25, 1995	Conduct TOT Conduct Lab Installation and Training
January 26, 1995	Return to Kathmandu
January 27 - 28, 1995	Report Preparation
January 30, 1995	Debrief USAID/Nepal, MOH. Submit draft report
January 31, 1995	Depart

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NEPAL: TECHNICAL ASSISTANCE TO MALARIA RESEARCH AND TRAINING CENTER

CORE CONTRACT

SCOPE OF WORK

BACKGROUND

The Vector-borne diseases, Malaria, Leishmaniasis and Japanese Encephalitis are important public health problems in Nepal. To begin to address these issues, the government of Nepal, with support from USAID, established the Malaria Research and Training Center (MRTC) in Hetauda. With the implementation of the Ministry of Health's integration plan (1987-1988), a great number of staff from District Public Health Offices and Ilaka health posts needed to be trained in malaria control to provide them with the skills required to carry out routine malaria control activities in their respective areas. However, Malaria Research and Training Center's physical facilities (dormitory and classroom) and laboratory facility (space equipment) were inadequate to train the required manpower adequately and in a timely manner. Therefore, USAID/Nepal has agreed to assist His Majesty's Government of Nepal (HMG)/Epidemiology and Disease Control Division (EDCD) to expand and upgrade the MRTC's physical facilities and augment its training capability, including improved laboratory facilities to meet current and future training and research needs.

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There are several players in Nepal who in one way or the other are connected with the MRTC. It is seen as important to enter into discussions both formal and informal with these persons/institutions. They are: the USAID mission, which has provided considerable support to the center, the Nepal Ministry of Health and the new director of MRTC. USAID/Nepal has executed a buy-in to EHP for technical assistance to the MRTC. The scope of work for that activity is attached. The purpose of this core-funded activity is to provide supplemental funding for this assistance to MRTC, conduct an assessment for the establishment of an epidemiological system as a possible follow-on, and explore opportunities for additional EHP activities in Nepal.

OBJECTIVES

1. To ensure a clear understanding of the current situation of Vector-borne disease and control in Nepal and of the MRTC.
2. To provide an EHP long-term consultant to support activities of the center for a 12-month period.

4. To prepare a final report at the end of the 12 months detailing accomplishments, lessons learned, and recommendations.

PRODUCTS

1. A trip report by the EHP Program Director for Tropical Disease detailing the status of the support to the MRTC and the potential for additional environmental health activities in Nepal.
2. A series of reports from the local coordinator including:
 - 12 month work plan
 - monthly status reports
 - a final report on the activity

TENTATIVE SCHEDULE

EHP Program Director for Tropical Disease

November 30, 1994	Depart for Nepal
December 4-12, 1994	Meetings with USAID Mission Meetings with Ministry of Health Meetings with local coordinator Field Visit to MRTC to assess lab and training needs. Meetings with MRTC Director Debrief USAID
December 13, 1994	Depart for U.S.

Local Coordinator

October 1, 1994 - September 30, 1995	Provide technical and administrative support to the staff and director of the MRTC. Prepare and submit reports to EHP.
November 1994	Plan and implement local support for visit of EHP Program Director for Tropical Disease
October 1, 1994 - January 31, 1995	Plan and implement local support for workshop to be conducted by EHP expatriate consultants in January 1995.

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APPENDIX C

INDIVIDUALS CONTACTED

Dr. Badri L. Shrestha, Director, Epidemiology and Disease Control Division (EDCD)
Dr. M. K. Bannerjee, Senior Medical Officer, EDCCD
Dr. R. N. Sinha, Director General, MOH
Mr. Matthew Friedman, Senior Technical Advisor, USAID/Nepal
Dr. T. W. Lim, World Health Organization, Nepal
Dr. V. L. Gurubacharya, National Research Council
Ms. Molly Gingerich, Chief, HFP Division, USAID/Nepal
Mr. Jitendra Shrestha, EDCCD
Dr. P.B. Chand, Chief, VBDC
Mr. Shreedhar Pradhan, EHP consultant
Dr. K. P. Panday, Director General, Department of Health
Dr. Acharya, Planning and Foreign Aid Section, Dept. of Health
Mr. Basu Dev Pandit
Mr. Shishir Panta
Mr. S.N. Jha, Laboratory Section, VBDC
Ms. Theodora W. Stervinou, Deputy Director, USAID Mission
Dr. O. T. Christiansen, WHO
Dr. Hanuman Mahaju, District Health Officer
Ms. Dawa Thapa, Associate Director (Health) U.S. Peace Corps, Nepal
Mr. Kumar Thapa, John Snow Inc., Nepal
Dr. Singh, Chief, Janakpur Zonal Hospital
Dr. Shresta, Chief, Biratnagar Zonal Hospital
Dr. Joy Barrett, U.S. Peace Corps, Washington
Dr. Sandy Collier, U.S. Peace Corps, Washington
Mr. David Oot, former Chief, HFP Division, USAID Nepal (currently Director, USAID Office of Health and Nutrition)