

USAID Program
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Semi-Annual Report
August 1, 2000 - January 31, 2001

During this reporting period, August 2000 through January 2001, HealthTech has reorganized and renamed many of the HealthTech teams in order to better reflect the nature of the current mandates and work of those teams. Many of the HealthTech projects have evolved from the research and development phase into evaluation and introduction of technologies. This report is arranged according to those new designations, with references to the specific technologies within that broader context.

Immunization Technology Introduction

The Immunization Technology Introduction (ITI) team has brought together, under one umbrella, a variety of projects that focus on safe injection and vaccine management. These include:

Training Materials and Technical Articles

The ITI team finalized publication of *Giving Safe Injections: Introducing Auto-Disable Syringes*, a manual designed for health workers working mainly in immunization programs. UNICEF will distribute 1,300 copies of the publication and 130 CD-ROMs to their field offices throughout Africa; the Zimbabwean Ministry of Health (MOH) is sending 1,300 copies to local health facilities; and WHO/AFRO received 1,000 copies for distribution at upcoming training workshops. The document was also sent to 60 USAID/PHN officers in the missions. The manual is now available on-line at <http://path.org/resources/safe-inj-pdf.htm>, and PATH encourages organizations to adapt, reproduce, and translate the material to meet local needs. PATH is currently arranging for a French translation to be available on-line by the end of April.

Other activities included translation into Russian of the WHO-policy statement entitled "The use of opened multi-dose vials of vaccine in subsequent immunization sessions" for use in the Ukraine, and for use by WHO.



In addition, the "Vaccine Vial Monitor Training Cards," developed under HealthTech, were translated into Portuguese and French with assistance from WHO/AFRO. WHO/AFRO has requested a second printing of the English version to distribute with the Portuguese and French versions this spring.

HealthTech staff members wrote two articles that were included in UNICEF's *Vaccine and Immunization Products Guidelines for Countries Eligible for Support From the Global Fund for Children's Vaccines* (published in October 2000). One article provided basic information on vaccine vial monitors, and the other described factors for consideration when choosing between auto-disable syringes or self-contained unit dose delivery systems (*i.e.* Uniject™) for liquid vaccines.

Technology Availability

A major milestone for HealthTech was celebrated in November at the official launch of the Uniject filling line at PT. Bio Farma, an international vaccine manufacturer in Indonesia. Invited guests included the Minister of Health, other MOH officials, representatives of USAID, PATH, and the Bill & Melinda Gates Foundation, and other Uniject syringe collaborators from Thailand, Korea, and Mexico. Bio Farma is filling Uniject syringes with



Minister of Health of Indonesia injects Dr. Gordon Perkin of the Bill & Melinda Gates Foundation with Uniject

Hepatitis B vaccine; the filled devices are being distributed and used in EPI programs throughout Indonesia. Another ceremony occurred the day following the official launch in which the first baby was vaccinated with hepatitis B vaccine in a Uniject syringe as the launch of the introduction program. Bio Farma will also fill Uniject syringes with tetanus toxoid for use in the UNICEF Partnership for Child Health program to eliminate maternal and neonatal tetanus.

Hepatitis B vaccine in the Uniject syringe is now available via the Global Fund for Children's Vaccine. The price range quoted for the period 2001 to 2003 is US \$0.57 to US \$1.44 per dose. Vietnam plans to use the Uniject syringe format to deliver hepatitis B vaccine in their immunization program.

Vaccine vial monitors were specified on all vaccines to be purchased by UNICEF from 2001-2003, including new vaccines purchased by the Global Fund.

During this period, HealthTech assisted WHO and the Global Alliance for Vaccine and Immunization (GAVI) with an analysis of auto-disable syringe technology and its applicability for reconstitution purposes. HealthTech also evaluated VaxiCool™, a high-efficiency, solar-powered refrigeration and outreach system.

Country Assistance

HealthTech has provided assistance to various countries during this six months with emphasis on safe injection practices and vaccine management. In August 2000, technical and financial support were provided to an EPI logisticians' workshop in Lagos, Nigeria. A PATH staff member conducted training for 50 participants for two weeks on multiple vaccine-management topics. The workshop was conducted in collaboration with WHO/AFRO and WHO/Nigeria.

Other activities included protocol development for a cold chain study in Ukraine, and participation in the WHO Working Group "Best Infection Control Practices for Injections," held in Geneva, October 19-20, 2000. This group drafted recommendations defining what constitutes safe and unsafe injection practices, based on evidence and expert opinion.

As part of the Partnership for Child Health initiative, HealthTech is preparing background materials for the first set of countries introducing tetanus toxoid (TT)-Uniject. Introduction will take place initially in Afghanistan, Mali, Burkino Faso, and Uganda. In addition, HealthTech staff have received requests for assistance with introduction of hepatitis B vaccine/Uniject syringe in China, and TT-Uniject in Cambodia.

Presentations were made by HealthTech staff at the Safe Injection Global Network (SIGN) meeting in Cairo, Egypt, in October 2000; the WHO/Southeast Asia Regional Office Immunization Safety Workshop in Colombo, Sri Lanka, in November 2000; and the Steering Committee for Immunization Safety in Geneva in November 2000.

S Safe Injection for Reproductive Health (SIRH)

Oxytocin in Uniject syringes

The full analysis of the data is nearly complete from the study of oxytocin in Uniject syringes among midwives on the island of Lombok in Indonesia. During this period, a MOH representative reviewed all local data forms to clarify and analyze information about postpartum hemorrhage.

The proposed technical meeting in collaboration with WHO/Geneva on issues related to use of oxytocin in Uniject syringes was postponed to mid-2001, because of a delay in the completion of the WHO/Angola study report and the delayed publication of another study by WHO on oral misoprostol. WHO received a request from the Mexican Ministry of Health regarding the introduction of oxytocin in Uniject syringes in a country-wide maternal health program. HealthTech facilitated the linkage between the Mexican MOH and the Mexican pharmaceutical manufacturer (Aplicaciones Farmaceuticas) who provided the previous batch of oxytocin/Uniject syringe devices.

Gentamicin in Uniject syringes

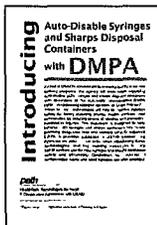
HealthTech is now in the process of testing the compatibility of gentamicin solution with the Uniject syringe. PATH has written a draft testing protocol for a

six-month period at various storage temperatures (control at -20°C, cold chain at 5°C, accelerated at 40°C, and ambient at 25°C). Initial testing would be for changes in appearance, separation, etc., using a gentamicin dosage of 5mg/kg once daily for infants aged 0-7 days (based on an average 2.5kg infant weight). The injection volume would be 0.5ml using a gentamicin concentration range of approximately 20-25mg/ml. PATH obtained a Uniject syringe manual filling protocol from BD with the intent to fill in Seattle using a lambda hood. PATH has identified and partially procured supplies needed for manual filling, and is in the process of identifying local contract labs that can help with the work.

In addition, HealthTech is conducting background research in preparation for an economic analysis of the programmatic costs of producing and distributing gentamicin in Uniject syringes. PATH is in the process of obtaining actual cost data from a study in India that tested home-based treatment of neonatal sepsis with gentamicin (Bang et al:1999); it is anticipated that these data will be used as the basis for a case study and analysis of programmatic costs. Analysis of the cost of home-based treatment of sepsis relative to neonatal death and/or illness averted, which will be used for broader advocacy purposes with the public health community is in the initial planning stages.

Injectable Contraceptives

During this reporting period, HealthTech staff assisted USAID in the organization of a workshop to be held in Washington, D.C, in February on bundling Depo Provera with AD syringes and sharps containers. The workshop will involve cooperating agencies who work with USAID in providing DMPA to developing-country family planning programs. HealthTech staff will make presentations on technical and introductory issues with regard to these two technologies.



Vaccine Reconstitution Technologies

At meetings with Universal Preservation Technology (UPT), HealthTech's early prototypes of the auto-

reconstitution devices—to be used with vaccines such as measles, that need reconstitution before use—were received with enthusiasm. The technical experts felt this approach could be developed to automatically reconstitute sugar-dried vaccines as diluent is injected through them. Actual sugar-dried vaccines are not yet available, but testing is planned with the sugar-dried carrier.



The Global Fund for Children's Vaccines recommended that AD syringes be used for mixing lyophilized vaccines supplied by GAVI, and requested feasibility and source information. HealthTech researched the applicable field issues, design criteria, and availability. In working with the AD syringe manufacturers, a design specification and list of available products will be developed.

N Needle-Free Injection Systems

The Needle-Free team has continued to support Felton Medical Inc., United States, and Chemical Automatics Design Bureau (CADB), Russia, in the redesign and development of the BI-3M injector technology. The Needle-Free team recently provided design input on new designs for BI-3M components that will be manufactured in the United States. This marks the first step in transferring the CADB injector technology outside of Russia, in order to make it available both domestically and internationally. Felton Medical has accelerated their efforts to introduce the BI-3M into the market as soon as possible.

Currently, PATH plans to assist both groups on a 510(k) application to the Federal Drug Administration (FDA) for the BI-3M, which is planned for the third quarter of 2001. During summer 2000, representatives of Felton Medical held an informal meeting with the FDA on the planned application for the BI-3M. Contamination safety requirements, and Felton's plans to demonstrate contamination safety were discussed. The PATH fluorescein contamination test procedure developed under HealthTech was prominently

presented as the method for demonstrating contamination safety. The FDA has indicated that this *in-vitro* bench test, demonstrating contamination safety, may be accepted as part of the application in lieu of animal or human contamination safety testing. In the upcoming months, PATH will work with Felton Medical to further refine the fluorescein test procedure and to conduct the necessary contamination testing to include in the application to FDA. After the 510(k) clearance is granted to Felton Medical, PATH will begin planning design-stage field trials in order to evaluate the injector in a developing-country setting. These “mock” injection field trials will provide valuable information regarding the appropriate elements of redesign required to ensure the suitability of the final BI-3M design for the developing world.

In addition, the Needle-Free team, with WHO, has drafted new specifications for multi-dose jet injectors that will be further refined and eventually implemented. These specifications are intended to guide manufacturers of multi-dose jet injectors, such as Felton Medical, in their product development efforts. The Needle-Free team has also initiated discussions with WHO on further contamination safety requirements that Felton Medical will need to demonstrate in order to receive WHO acceptance of the BI-3M.

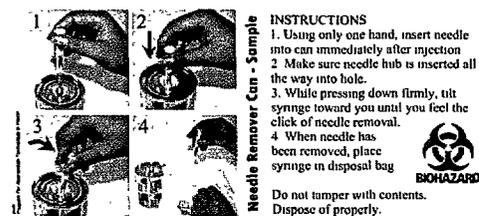
The Needle-Free team will attend the next International Standards Organization (ISO) working-group session on “Needle-free injectors for medical use—requirements and test methods,” currently scheduled for July 2001, in order to represent developing-country user needs as they pertain to the requirements and specifications of jet injectors.

M Medical Waste Disposal Technologies

The HealthTech Medical Waste team has decided to narrow its focus to address problems of disposal of needles and syringes used to give injections. The team is now working primarily on the development of two promising technologies designed to safely remove needles from syringes and contain them at the location where injections are given.

The Disposal Can

HealthTech has continued to develop the small, integrated, needle-removal and containment can. The disposal can is designed for a limited-use setting with AD syringes that have luer-slip needle attachments. Together with a disposal bag, the disposal can could be packaged with AD syringes to provide a low-cost disposal system for use at the location where injections are given. A provisional patent for the design was filed in August 2000. The concept received enthusiastic support among 30 health care workers in India during a small, design-stage product evaluation. Twenty-nine out of 30 nurses were able to successfully remove the needle from the syringe using pictorial instructions with minimal words that appeared on the can’s label, indicating that the device is fairly intuitive and easy to use.



Recent design concepts include containers made of plastic or cardboard, in addition to the original metal can material. HealthTech is currently discussing technology transfer of the device to syringe and waste-disposal companies.

The Needle Puller

While the disposal can represents a viable, low-cost option for containment and disposal of used needles, its use is limited to settings where luer-slip needles and syringes are used. Most public health settings use several types of syringes, with a variety of mechanisms for attaching the needle to the syringe. Therefore, HealthTech is actively working on a needle-puller device for mixed-use settings that will safely remove the needle from any syringe. While this device will be broader in its application than the disposal can, it will also be more costly. HealthTech continues to explore design refinements that could lower the cost of this device. With the assistance of Dr. Janine Jagger of the University of Virginia—an expert on needlestick prevention in the United States—HealthTech has

drafted a protocol for a field study in India to evaluate safety, acceptability of use, and design criteria of the needle puller when used in immunization settings. Qualitative data gathered through observation, questionnaires, and focus-group discussions; and quantitative data on the occurrence of needlestick injuries will be collected and analyzed. The evaluation will be conducted in summer 2001 in cooperation with PATH India.

D Delivery Kit

PATH staff made two presentations during this reporting period on safe birth delivery kits at conferences sponsored by the USAID-supported NGO Networks for Health. The first presentation, entitled "Clean Delivery Programs: Lessons Learned," was made at the Millennium Health Conference "Lessons Learned on Reproductive Health" hosted by PLAN International and Adventist Development and Relief Agency (ADRA) from August 14-19 in Nairobi, Kenya. The second presentation, entitled "Clean Delivery Kit Programs: An Overview," was made at the conference "Safe Motherhood-Achieving More Together" that took place November 20-24 in Chiang Mai, Thailand.

During the last quarter of 2000, PATH monitored and initiated several delivery kit projects. Development of the comprehensive resource, *Basic Delivery Kit Guide*, continued, and the manual was sent to external reviewers in January 2001. The document is expected to go to press in June 2001.

In January 2001, a protocol for quantitative and qualitative research on the use of delivery kits and their impact as a health intervention on cord infection and puerperal sepsis in Mwanza region of Tanzania was designed and submitted to PATH's Human Subjects Protection Committee and to USAID. The study will be conducted in conjunction with the Tanzanian Ministry of



Health, CARE, and the National Medical Research Institute, and is expected to begin by the second quarter of 2001.

G Genital Ulcer Disease Diagnostic Team (Syphilis ICS Test)

Technology Transfers

During this reporting period, a license agreement was executed with J. Mitra, Pvt., Ltd., a diagnostics manufacturer in New Delhi, India, for the technology transfer of the rapid syphilis test based on the 17kDa antigen. The technology transfer will take place in spring 2001. Discussions were also held with Lee Labs regarding a technology transfer. However, following the restructuring of Lee Labs' parent company, Becton Dickinson, Lee Labs was unable to pursue commercialization of this technology, and the negotiations were put on an indefinite hold. Also during this period, HealthTech evaluated a new, commercially available source of 17kDa antigen in the laboratory and field, for use in the PATH ICS syphilis test, since the original source has been discontinued.

Other Team Activities

HealthTech assisted in the evaluation of rapid syphilis tests during this six months by:

- Funding and coordinating a field evaluation of Acon syphilis tests on Peruvian sera. Testing is currently underway.
- Evaluating the AmeriTek and Orchid syphilis tests against a banked panel of select specimens, and providing confidential feedback to manufacturers.
- Sponsoring Dr. John Sellors of PATH to attend the WHO Collaborating Center Annual Review Conference in Nairobi where he initiated discussions with Dr. Marlene Temmerman of University of Ghent, and Dr. Joan Kreiss of University of Washington on the possibility of using their trials and specimens to evaluate syphilis tests. Dr. Temmerman has large trials planned in China, Nicaragua, Mozambique, and Kenya as well as on existing specimen banks of sera. She agreed, in principle, to collaborate on an evaluation of syphilis tests from multiple manufacturers that would meet

FDA approval. HealthTech will send language for informed consents that would allow future access to the specimens while details of the protocol are worked out with the FDA.

- Encouraging inclusion of all interested manufacturers in upcoming trials, HealthTech has compiled a list of manufacturers of rapid syphilis tests. After contacting manufacturers to verify the existence and status of their tests, HealthTech narrowed the list to four rapid tests that use whole blood, only one of which has any data supporting adequate performance. The list was shared with WHO and CDC.

Peer Reviewed Publications

Two abstracts were submitted to the International Congress of Sexually Transmitted Infections, to be held June 24-27, 2001, in Berlin. These abstracts will present the results from two studies in Peru. The first study evaluated the design-phase versions of the HealthTech ICS test on sera from men in a high-prevalence population. The second study compares three HealthTech tests and two commercially available rapid diagnostic tests to conventional standards by using sera from women in a rural, low-prevalence population. Two manuscripts are being prepared.

Identifying the Barriers to Improved Syphilis Control in the Ukraine

HealthTech staff continue to interview key health staff in the Ukraine to better understand the barriers to point-of-care syphilis detection and treatment. To identify the influential decision-makers, staff met with MOH officials, members of the Association of STD Specialists, and Kyiv's Dermato-Veneriologist Center officials. Discussions have identified contradictions between the guidelines and practices of syphilis control, and developed interest in changes needed to stem the current syphilis epidemic.

CDC-PATH Study Using Rapid Tests in the United States

HealthTech prepared and packaged syphilis test strips for use in a CDC study to be done at two health departments in the United States. An unexpected problem was encountered during the human subjects

review. PATH's institutional review board (IRB) operates with a USAID-issued multiple-project assurance. This USAID assurance was rejected by the institutional review board (IRB) of CDC and PATH must now get a Department of Health and Human Services (DHHS) accepted single or multiple project assurance in order to be a sponsor, to author publications in journals such as the *Journal of Infectious Diseases*, or to be a co-investigator of the study.

C Cervicitis/Urethritis Diagnostics Team (Gonorrhea and Chlamydia ICS Tests)

Near the end of this reporting period, a decision was made to combine the HealthTech Gonorrhea (GC) and Chlamydia (CT) ICS test teams. This was done because both tests were at a similar point of development (final bench validation/early field evaluation) and were seeking biological samples and field evaluation opportunities from similar collaborators. The resulting Cervicitis/Urethritis team will continue work on both projects.

Samples for both tests are currently being collected at the University of Alabama; however, significant delays have been experienced due to the length of time to obtain IRB approval. These samples should be at PATH soon. The GC test has been evaluated against swab samples from females obtained from the University of California at San Francisco. The sensitivity and specificity of the test, compared to ligase chain reactions, was 50% (13/26) and 100% (25/25), respectively.

The sensitivity and specificity results of the GC test on discarded swab samples from symptomatic males and females attending the STD clinic at Harborview Medical Center in Seattle are encouraging, although the sample sizes are too small to draw concrete conclusions. Seven out of seven of the positive samples (6 male, 1 female) were detected; and 18/18 of the true-negative samples (15 male, 3 female) tested negative with the PATH test. This work is continuing.

Urine samples using a urine filtration device (UFD) are currently being collected from symptomatic and



Urine Filtration Device

asymptomatic patients at STD clinics in Zimbabwe. These samples are being stored frozen and will be evaluated with the ICS test over the next few months.

Two possibilities for prospective evaluators of both tests are being considered—the Royal Institute of Tropical Medicine in the Philippines, and Dr. Temmerman's group in Kenya or Mozambique. A meeting will be held in early March 2001 with Dr. Temmerman's group to discuss their possible provision of samples for testing at PATH, or collaboration in field evaluation.

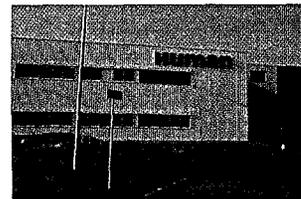
T Tropical Disease Diagnostic Team (Malaria [*Plasmodium falciparum*] ICS Test)

The new Tropical Disease Diagnostics team (formerly the Malaria ICS team) continued to make progress on the year 2000-01 team objectives, working on several fronts simultaneously. Efforts have been focused on the areas of technology development, introduction, and business.

In the area of technology development, the team continued its work on developing monoclonal antibodies, one of the more expensive components of the malaria ICS test. The goal is to increase the availability of these malaria antibodies to commercial manufacturers of malaria tests. Technical staff have also continued to monitor and support production of the PATH-developed malaria ICS test by SPAN Diagnostics Pvt. Ltd., a company in India. Since the HealthTech-developed test detects only *plasmodium falciparum* (*P.f.*), the team has decided to conduct a review of other existing tests and reagents for detection of both *P.f.* and *Plasmodium vivax* (*P.v.*). Other possible sources of these technologies will continue to be monitored; active involvement in development or introduction activities of a combined *P.f./P.v.* test is being considered.

Recognizing that the demand for rapid malaria tests in developing countries far surpasses current supply, the HealthTech team decided to identify an additional manufacturer with global distribution capabilities. As a result, the team's business staff recently negotiated a license agreement with Human GmbH in Wiesbaden, Germany, for the technology transfer of the production

know-how for the *P.f.* ICS strip. Human is a large diagnostics manufacturer with a strong commercial interest in Africa and Asia, as well as being a producer of high-quality tests. Technology transfer is scheduled to be carried out by technology development staff—who visited Human manufacturing facilities in January—at PATH's facilities in the next quarter. The team's business and program staff have developed a database of manufacturers of malaria tests and have almost completed a web page so that others can have access to this information via the Internet.



Under introduction activities, the team has contributed to a research protocol in Peru that is being carried out by the Peruvian government with assistance from CDC. This research looks at the operational issues surrounding use of rapid malaria diagnostic tests by trained village volunteers. HealthTech staff have continued refinement of a tool to help decision-makers select the most cost-effective malaria tests for their particular settings; the tool is now ready for field testing. Possible opportunities for testing the tool, as well as other potential collaboration opportunities, will be explored at a meeting at WHO with staff of Roll Back Malaria in early March 2001.

T Tuberculosis/Respiratory-Tract Infection Diagnostics Team (Tuberculosis ICS Test)

Evaluation of the HealthTech Tuberculosis ICS test, using the WHO reference panels from Uganda, Gambia, and South Africa, was conducted this term. The results indicated that the test has adequate performance characteristics regarding sensitivity in the HIV sero-negative population (overall sensitivity is 76.5%), but inadequate sensitivity in the HIV sero-positive population (overall sensitivity is 40.5%). Similarly, the sensitivity of the test with HIV sero-negative sera from sites in India, Brazil, and Indonesia is acceptable. To address this problem, HealthTech staff are currently investigating the possible additive effect of three new TB antigens in an effort to improve the test sensitivity in HIV sero-positive populations.

Although the specificity of the test using American blood donors or purified protein derivative-positive patients attending the Harborview Medical Center TB Clinic in Seattle, WA is very good, the specificity of the test in endemic controls needs to be further evaluated. In this regard, HealthTech staff are actively trying to obtain serum samples from both HIV sero-negative and sero-positive endemic controls.

Plans for prospective evaluation of the test at two sites in India are continuing, but these studies may not be initiated until adequate performance of the test in HIV sero-positive populations can be demonstrated.

PATH is in the final stages of executing a collaboration agreement for use of proprietary TB antigens for the commercialization of the TB ICS test.

M Molecular Platform Diagnostics

Discussions with experts in the field have indicated that a molecular-based platform for detection of gonorrhea and chlamydia should have a simple nucleic acid extraction and purification step, an amplification step, and, if possible, a non-instrumented read-out of the test results. In this regard, HealthTech staff are collaborating with an expert in the molecular biology of gonorrhea and chlamydia from the University of Washington on the development of a multiplex PCR-based nucleic acid amplification step. The University of Washington will also assist in the development of a simple and rapid nucleic acid extraction system that will enable urine to be used as the clinical sample.

The team has also recently recruited a molecular biology product development specialist for staff. The team, in parallel with the efforts of the University of Washington, is currently focusing on the development of a simple, immunochromatographic strip test for the visual detection of the amplified target DNA sequences.

In addition, PATH has contracted a consultant to assess the needs and opportunities for use of molecular diagnostics for detection of gonorrhea and chlamydia in the developing world. The final report from this investigation will be available in April 2001.

N Nutritional Disease Diagnostics Team (Retinol Binding Protein-Enzyme Immunoassay [RBP-EIA])

Validation studies using the RBP-EIA were carried out in two separate studies. The first study used samples from a population of mothers and children at-risk for vitamin A deficiency (VAD) in Managua, Nicaragua. The second study used sera from children from another at-risk population in Cambodia. The collaborators for the first study were Micronutrient Operational Strategies and Technologies Project (MOST), Craft Industries, and CDC. Helen Keller International (HKI), facilitated by an ongoing collaboration with Johns Hopkins University, collaborated on the second study. The high-performance liquid chromatography (HPLC) retinol data from the MOST evaluation was generated at the Institute of Nutrition of Central America and Panama; Guatemala City, Guatemala (INCAP). These data were discrepant when compared to the PATH RBP-EIA, as well as other methods evaluated in this study. Therefore, HealthTech laboratory staff researched and brought in-house a relatively simple and high-yield, reliable method for determination of serum retinol by HPLC, which was applied to a subset of sera from the Nicaraguan panel. The complete sample group was also re-analyzed by RBP-EIA, and radial immunodiffusion (RID) plates for RBP. The HPLC data correlated well with the results from the PATH RBP-EIA and RID plates. Because of the original discrepancies with the data generated by all the participants in the Nicaragua study, INCAP and CDC are currently re-analyzing all study samples. These findings will be made available as soon as the analyses are completed.

The study with HKI, which was carried out in HKI's laboratories in Indonesia, yielded a small data set ($n = 190$) that also demonstrated that the RBP-EIA correlated well with HPLC retinol. Due to time and logistical difficulties, the total number of specimens tested was lower than originally planned. However, the total number of samples analyzed, while small and not statistically significant, correlated well with HPLC retinol ($r^2 = 0.79$) and indicated that the RBP-EIA could be a suitable substitute for serum retinol. Further

High Institute of Public Health in Alexandria, Egypt. One of the studies is about examination and treatment of children with schistosomiasis. The other study will monitor and treat 226 individuals who have been followed for about eight years. This data is to be used for defining cohorts in order to provide samples for *in vitro* testing of vaccine candidates. This is a prerequisite for future testing of vaccine candidates in human subjects.

AIDS Initiatives Project (AIP) in Irian Jaya-Phase II/Indonesia

The AIDS Initiatives Project (AIP) Phase II, which ran from October 1, 1997, to September 30, 2000, has reached completion. For the last few years, funding for the project has been provided to PATH via field support money to HealthTech. AIP extended AIDS prevention activities implemented under Phase I of the project, and expanded into additional project sites in Irian Jaya during Phase II.

Over the life of the project, PATH designed the AIP to build capacity among Government of Indonesia agencies and indigenous nongovernmental organizations (NGOs) to effectively develop targeted interventions for those at highest risk for HIV infection. The project supported 12 NGOs in implementing AIDS-prevention programs that reached sex workers, port workers, gold miners, factory workers, and high school students. In the development of prevention programs, PATH supported an outreach and peer-education approach, coupled with increased access to services for sexually transmitted infections (STIs). Each intervention included a strong evaluation component, with baseline, midterm, and final surveys measuring knowledge, attitudes, and practices (KAP) in almost every intervention site. PATH's capabilities in the area of appropriate technologies also helped prioritize access to STI services, as well as the development of simple, appropriate diagnostics. The AIP also contributed significantly to surveillance of STIs and HIV, with large studies undertaken in 1998 and 2000 in seven major cities in the province of Irian Jaya.

PATH played an important role in building partnerships in Irian Jaya to address HIV and AIDS. PATH identified NGO collaborators, initiated dialogue with governmental decision-makers and when possible,

facilitated partnerships between NGOs and the government to coordinate AIDS programming.

PATH built local capacity to design, implement, and evaluate HIV/AIDS prevention and control programs in Irian Jaya. PATH provided a series of focused training programs for NGOs that included basic STI and HIV/AIDS information, interpersonal communication, outreach strategies, and qualitative and quantitative data collection. PATH also provided ongoing technical support and on-site technical assistance to NGO partners in the areas of behavior change and risk reduction.

Health Information Systems (HIS)/Ukraine

All oblasts (regions) are now routinely submitting new reports on immunization practices which are based on the reformed Health Management Information System (HMIS). The number of technical mistakes has been considerably reduced. The oblasts are increasingly using the information for making management decisions. PATH's ongoing, on-site training is regarded as a crucial means for strengthening local information management skills.

During this reporting period, the HIS team continued the final round of monitoring and on-site training and technical assistance visits to all oblasts of the country. The latest modifications to the information system were introduced, and the software application was installed. The focus of attention was on analyzing and correcting mistakes, strengthening local information management skills, and ensuring sustainability of the reform and the new system throughout the country. A six-month supply of modified report forms for 23,000 immunization facilities and nearly 700 regional san-epid stations (SES) of Ukraine were distributed to oblasts during this period.

In November 2000, PATH organized and conducted an international conference in Kyiv. The conference was attended by the chiefs of oblast pediatric and epidemiological services, key officials from the Ukrainian MOH, the National Center for Epidemiological Surveillance, and the Institute of Epidemiology, as well as by representatives of USAID, and delegations from Belarus, Moldova, and Georgia. Participants stressed the importance of the improved quality of data and its usefulness in management

decision making, and praised PATH for its influence in speeding up the substantial reduction of the list of contraindications and the re-centralization of vaccine procurement in Ukraine. The representatives from Georgia and Moldova consider it necessary to incorporate elements of the Ukrainian HMIS into their own countries' systems, and a representative from Belarus addressed the U.S. government representatives with the request to provide technical assistance in adapting the whole model to Belarus.

The MOH used the new HMIS to develop its strategic multi-year immunization plan. This system was very useful in preparing Ukraine's application for Global Alliance for Vaccines and Immunization (GAVI) assistance, which was submitted in January 2001.

PACT-CRH/India

PACT-CRH (Program for Advancement of Commercial Technologies—Child and Reproductive Health) is a program in India, partially supported through field-support funding to HealthTech. During the last six months, PACT-CRH has continued work in the following areas:

Diagnostics

HealthTech and PACT-CRH have provided assistance in locating a dependable supply of malaria monoclonal antibodies to one Indian diagnostics manufacturer whose malaria ICS test went into commercial production in September 2000. HealthTech has continued to monitor initial pre-production lots of tests. Another PACT-supported manufacturer started production of a rapid syphilis test in December 2000. Negotiations are underway for the transfer of a rapid diphtheria test, as well as a manufacturer for the HealthTech syphilis test.

Vaccine Vial Monitors (VVMs)

HealthTech is facilitating the installation of a VVM-labeling machine for adding VVMs to vials of measles vaccine at the Serum Institute of India (SII), for supply to UNICEF. The machine has been installed and trial batches have been run.

Vaccine Preservation

A major Indian vaccine manufacturer continues negotiations with a U.S. company for transfer of a

vaccine preservation technology. PATH identified the source of the technology and is facilitating the process.

Medical Waste

The PACT-CRH team is working with the HealthTech Medical Waste team to further define opportunities and technologies for management of sharps waste in India. PATH staff visited India in August to field test the prototype disposal cans which might be used for removing the needles from auto-disable syringes. The cans were tested with healthcare workers in a primary health center, and useful feedback was collected.

Injectable Contraceptives

In response to requests by USAID and Industrial Credit and Investment Corporation of India (ICICI), HealthTech and PACT/CRH are assisting with DMPA technology transfer and identification of potential Indian manufacturers of DMPA. A PATH consultant will explore opportunities to transfer DMPA technology to Indian manufacturers with the capability to manufacture injectable contraceptives. The consultant will visit facilities of several interested manufacturers in March 2001.

Support on Good Manufacturing Practices (GMPs)

PACT/CRH assisted Medtech Products, Ltd., a manufacturer of female condoms in India, with preparations for an upcoming FDA audit. A PATH consultant assessed the company's overall compliance with FDA requirements, specifically, as it applies to the GMPs of the manufacturer for its line of barrier contraceptives, and made recommendations for improvements prior to the actual FDA audit.

Other Projects

Additional synergistic activities between HealthTech and PACT/CRH are being planned with in-country partners. Both plan to assist with rapid gonorrhea, chlamydia, and tuberculosis test development; perform an evaluation of HIV rapid diagnostic kits available in India; conduct user-based research on the female condom; and perform a design-stage evaluation of a medical waste technology called the needle puller. Preparations are also being made to participate in the global meeting on safe injections held by SIGN and Technet in India in September at WHO/SEARO.