Sharing PATH's experiences with the global health community

DIRECTIONS
IN GLOBAL HEALTH

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Sridharan Rangachari

INSIDE:

Protecting Asia's children

Preparing the way for a Japanese encephalitis vaccine

The recent outbreak in Nepal and India has highlighted the need to control Japanese encephalitis (JE), a leading cause of death and disability in Asia. The disease mainly strikes children younger than 15 years, and approximately 70 percent of those infected die or are brain damaged or otherwise disabled.

The JE virus is spread through mosquitoes that breed in rice fields or other areas of standing water. Hitting rural areas especially hard, JE has spread beyond south and east Asia, extending as far as Australia and Pakistan. In the last 50 years, the disease has killed an estimated three million children and caused long-term disability—including paralysis, mental retardation, recurrent seizures, and personality changes—in four million more.

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Exposing violence against women

Research sheds light on global trends

Project name
Research and advocacy on gender, violence, and human rights

Location
Global

Partners
World Health Organization; London School of Hygiene and Tropical Medicine; and local research and women's organizations in Bangladesh, Brazil, Ethiopia, Japan, Namibia, Peru, Samoa, Serbia and Montenegro, Tanzania, and Thailand

Funders
Swedish Agency for International Development Cooperation, Moriah Fund, World Health Organization

For more information
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Over the last decade, advocates and researchers have successfully challenged the idea that violence against women is simply a matter of family privacy and cultural norms. Evidence is mounting that gender-based violence persists in countries all over the world and is associated with serious health conditions—including chronic pain, decreased physical ability, increased risk of unwanted pregnancy and sexually transmitted infections, mental health problems, and pregnancy complications.

But even as the global health sector begins to recognize violence as a health problem, gaps in knowledge hinder an effective response: How many women suffer? Where? What are their needs? What can be done to prevent violence? The questions remain in part because so much of women's pain and humiliation is suffered at home, behind closed doors, and so few women feel safe enough to denounce it publicly.

To answer these questions and inform their solutions, PATH has partnered with international agencies and local organizations to carry out research, training, and advocacy activities. These efforts have culminated in two groundbreaking publications that are being released this month: the *WHO Multi-country Study on Women's Health and Domestic Violence against Women* and *Researching Violence Against Women*.

Understanding the roots of gender-based violence

The *WHO Multi-country Study on Women's Health and Domestic Violence against Women* is the most ambitious study ever conducted on gender-based violence. It involved more than 24,000 women in ten countries: Bangladesh, Brazil, Ethiopia, Japan, Namibia, Peru, Samoa, Serbia and Montenegro, Tanzania, and Thailand. Specially trained interviewers surveyed random samples (by household) of women aged 15 to 49 years. The goals of the study were to:

- Estimate the prevalence of violence (especially by male partners).
- Assess the extent to which violence is associated with various health outcomes.
- Identify factors that may either protect against or put women at risk of violence.
- Document and compare strategies and services that women use to deal with violence.

As a member of the core research team, PATH helped design the study, the questionnaire, and training manuals; train interviewers; and supervise field work. We also analyzed data and helped prepare national reports and the comparative findings just released.

More women at risk

The study confirms many conclusions drawn from earlier research. There was ample evidence of the serious health consequences of violence: women who reported violence were more likely to report poor general health, more physical symptoms of ill health, emotional distress, miscarriages, and abortions. They were also more likely to have considered or attempted suicide.

But there were also new insights—such as an overall greater prevalence of violence, especially in the home. In 13 of the 15 study sites, one-third to three-

quarters of women had been physically or sexually assaulted by an intimate partner. One to 28 percent of women who had ever been pregnant were assaulted during pregnancy. Much of this violence had been hidden and previously unreported—more than one-fifth of women reporting violence during the study had never told anyone about it before.

Contributing factors

Another key finding is that levels of violence vary greatly, both within and between countries. This new information raises questions for future research: which factors at individual, community, and national levels increase women's risk of violence? Which provide a measure of protection?

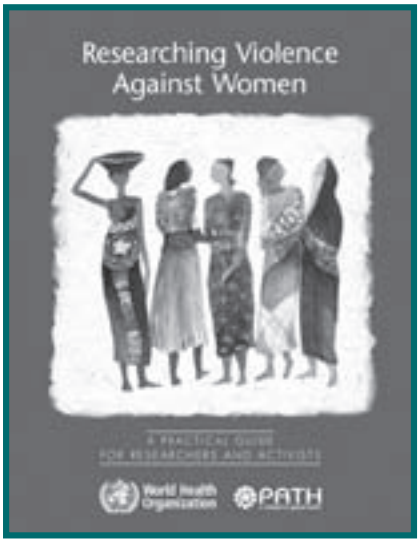
One factor may be women's internalization of social norms that justify abuse. In at least half the sites, 50 to 90 percent of women reported believing that it is acceptable for a man to beat his wife under certain circumstances, including if she disobeys him, refuses sex, does not complete the housework on time, or is unfaithful. These findings show how complex an issue gender-based violence is: although legal and institutional reforms are needed, they alone will not be sufficient to eliminate violence against women.

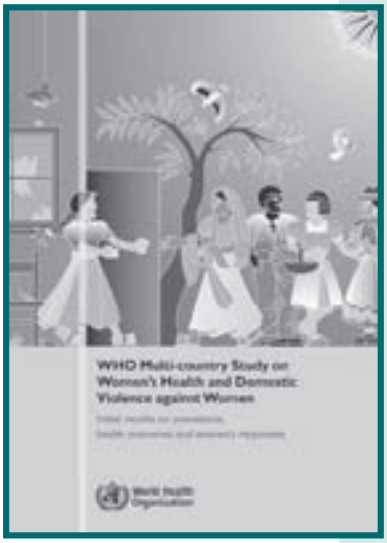
The report provides 15 recommendations for strengthening national commitments and action on violence against women, including promotion of violence prevention through educational systems, strengthened responses from the health care sector, support for women living with violence, and sensitized criminal justice systems.

A practical guide for researchers and activists

In addition to informing policies and health interventions, the World Health Organization (WHO) study presents a model for research that is methodologically rigorous and yields information that can be directly applied to violence-prevention activities. To help others undertake similar research, PATH and WHO have produced *Researching Violence Against Women: A Practical Guide for Researchers and Activists.*

The guide draws on the experience of researchers from more than 40 countries and presents methods for performing surveys and qualitative research on gender-based violence in low-resource settings. It covers all aspects of the research process, from study design to training for field workers. It also describes ways to use findings to influence decision-makers. Most important, it presents clear guidelines for protecting the safety of women participating in the research.





Two new resources provide insights and tools for preventing gender-based violence. Contact info@path-dc.org for copies or information.

PATH is also developing a curriculum for training public health students to use the guide. More than 20 researchers and grassroots activists from southern Africa attended a pilot training, recently held in Cape Town in conjunction with the Medical Research Council of South Africa. Participants learned ways to evaluate the impact of their own violence-prevention programs. PATH plans to expand this training program so that it can be incorporated into public health programs throughout Asia, Latin America, and Africa.

Future directions

The WHO Multi-country Study increased the research capacity of organizations in the study countries and promoted collaboration among researchers and women's organizations. PATH is now building on these networks by disseminating information and supporting regional initiatives to address violence.

As part of our broader efforts to reduce gender-based violence and advocate for scientifically sound, locally relevant solutions, PATH continues to serve as an advisor to the World Bank, the United Nations Division for the Advancement of Women, and UNIFEM. Together with partners across the world, we are helping expose the violence women endure, its effects on their health, and the inequity it propagates. ■

New channels for rapid diagnosis

Using microfluidic tests to identify infection

Project name
Microfluidic diagnostic tools

Location
Global

Methods
Technology development and advancement

Partners
Enteric card: Micronics, Inc., University of Virginia, University of Washington, Washington University

Fever panel: Micronics, Inc., Nanogen, Inc., University of Washington

Funders
Enteric card: National Institutes of Health/ National Institute of Allergy and Infectious Disease

Fever panel: Bill & Melinda Gates Foundation, through a Grand Challenges grant

For more information
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Identifying common symptoms of infectious diseases, such as diarrhea and fever, is easy. But in the developing world, a lack of resources and time often make identifying the cause difficult or impossible. The ability to treat disease immediately and effectively can mean survival for the individual and protection from outbreaks in the community.

A new technology, microfluidics, is making the complex task of identifying the cause of common illnesses faster and cheaper than ever before. PATH is working with private- and public-sector partners to develop inexpensive diagnostic tools based on microfluidic technology that are as small and rugged as a credit card. These tools will be able to test for multiple pathogens in a single sample and return results in less than two hours. Ideal for use in low-resource settings, they will reduce the cost of testing, speed diagnosis, and decrease reliance on centralized laboratory facilities.

Ending outbreaks before they start

More than three million people die of diarrhea-causing enteric disease every year,[1] and the greatest burden is in the developing world, where drinking water is often contaminated. Most cases can be treated with oral rehydration solution. Others benefit from antimicrobial treatment, which also helps limit the spread of disease—but is most effective when a causative organism has been identified.

Since 2003, PATH has partnered with Micronics and the University of Washington on the development of a disposable diagnostic tool that can identify any of the five pathogens—*Shigella dysenteriae* type 1, Shiga toxin–producing *Escherichia coli*, *E. coli* O157:H7, *Campylobacter jejuni*, and *Salmonella*—that most commonly cause enteric disease.

Research on the enteric card began with the goal of producing a tool for biothreat detection. PATH initiated work on a second use: point-of-care diagnosis in the developing world, where the industrial-world standards for diagnosis of infectious diarrhea—culture, enzyme immunoassay, and polymerase chain reaction (PCR)—are too slow, too nonspecific, or too expensive.

The lab-on-a-card in action

The final design will consist of two components: an assay card and a processor. Health care workers inject stool samples at one end of the assay card and then insert the card into the processor. The sample travels via microchannels through a series of stations that extract and amplify the DNA of any pathogens found. Later stations contain test strips that detect the DNA of each of the five pathogens. The complete sequence should take less than 20 minutes. In contrast, identification of the target pathogen in a standard laboratory is generally performed by culturing in incubators, which requires great skill and expensive equipment and takes 24 hours to several days.

The current prototype is portable, and the final targeted design for the processing instrument looks much like an iPod. The assay card uses dry, heat-stable reagents and is disposable, so that there is no risk of sample contamination, even when testing is carried out in less-than-ideal conditions. No manual intervention is required, other than connecting the card to the processor. Sensitivity and specificity should be comparable to the results achieved with conventional microbiological or PCR assays, and the cost should be much lower.

Broadening the application

The quick progress of the enteric card paved the way for PATH to join a team led by the University of Washington and supported by a Grand Challenges grant from the Bill & Melinda Gates Foundation. This team, which includes Nanogen and Micronics, two private-sector companies, is designing a similar tool to identify organisms that cause rapid-onset fever. In many developing countries, people who have very high temperatures are most likely to be treated for malaria; other diseases that also manifest as fever are often missed and can cause death in a very short period of time, too short to allow multiple courses of treatment if the first diagnosis turns out to be wrong.

Using microfluidic technology to build a diagnostic tool for fever presents new challenges. The cause of fever is difficult to identify because numerous types of pathogens—bacteria, viruses, and parasites—may be the source. The project team's goal is a prototype that can identify six of the most common causes of rapid-onset fever: influenza/parainfluenza viruses, *Plasmodium falciparum* (malaria), *Salmonella typhi* (typhoid/paratyphoid fever), flaviviruses (Japanese encephalitis, West Nile disease, and dengue fever), *Rickettsia* (tick- and louse-borne), and the measles virus.

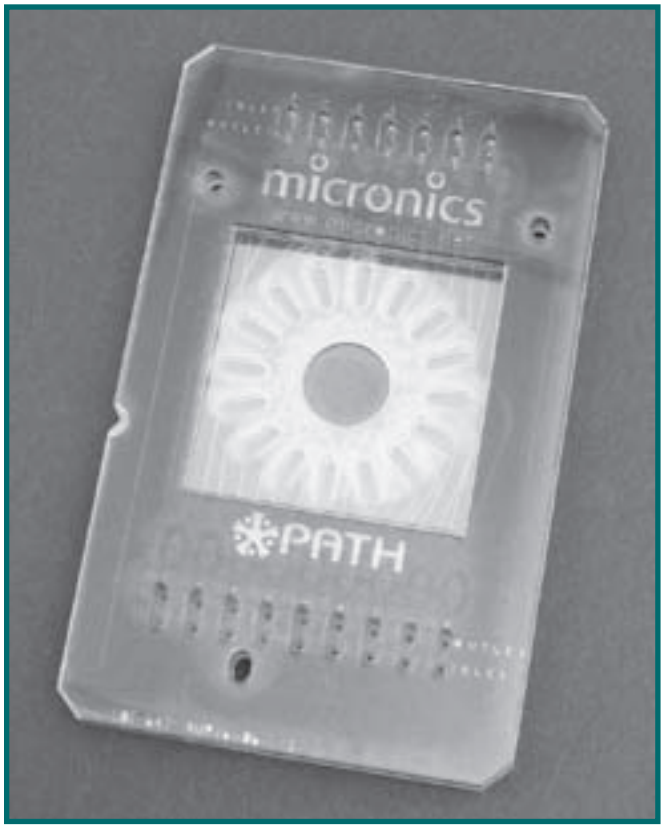
The new diagnostic tool also must analyze blood samples, rather than stool. Blood is easier to handle on microfluidic cards because its consistency and components are much more predictable, but pathogens are present at much lower levels. That means the tool must be much more sensitive to their presence. The fever panel also should give quantitative results, allowing health workers to distinguish between active and latent infection.

Once these challenges are met, the fever panel should be easily adaptable to many other types of infectious diseases, as well as to different sample formats, such as throat and vaginal swabs.

Next steps

The enteric card has been tested extensively on samples obtained from individuals in the states of Washington and Missouri, where most project partners are located. Field tests in Brazil are planned for 2007; these tests will involve hundreds of patients from several sites in northern Brazil and will be the last step in the testing phase.

For the fever panel, PATH is actively identifying sources of samples for all target pathogens and setting up prospective study sites for some. PATH also plays a major role in immunoassay development and selection of immunological reagents. In parallel, the project partners are developing the nucleic acid assays and designing modifications to the microfluidic cards. PATH and Micronics are assessing potential markets and commercialization options for the test. ■



In less than 20 minutes, the lab-on-a-card will be able to detect the DNA of five pathogens that most commonly cause enteric disease.

REFERENCE

1. Guerrant RA, Van Gilder T, Steiner TS, et al. Infectious Disease Society of America Guidelines. Practice guidelines for the management of infectious diarrhea. *Clinical Infectious Diseases.* 2001;32(3):331–351.

Expanding screening for cervical cancer

Better tests for the developing world

Project name
Screening Technologies to Advance Rapid Testing (START)

Locations
China, India

Methods
Technology development, public-private partnerships, user-responsive design

Partners
Arbor Vita Corporation, Digene Corporation, Cancer Institute Chinese Academy of Medical Sciences, International Agency for Research on Cancer, Tata Memorial Hospital

Funder
Bill & Melinda Gates Foundation

For more information
Please contact John Sellors, senior medical advisor, at jsellors@path.org.

A strong screening program is the key to preventing cervical cancer deaths. In the industrialized world, regular Pap smears—obtained by medical professionals and analyzed in high-tech laboratories every year for most of a woman's life—catch most cases of cervical cancer at an early, treatable stage. In the developing world, where limited infrastructure makes widespread Pap screening difficult, more than 200,000 women a year die from this preventable disease.[1]

Developing countries need screening programs that are appropriate for low-resource settings. To create a basis for successful screening in the developing world, PATH is collaborating with private-sector partners to bring two new tests to the market, both of which identify the presence of human papillomavirus (HPV), the pathogen that causes most cases of cervical cancer.

Saving resources through effective screening

Building on its work as part of the Alliance for Cervical Cancer Prevention, which evaluated an array of alternative screening and treatment methods, PATH is pursuing two promising technologies: Digene's HPV DNA test and Arbor Vita's test for E6, a protein biomarker that indicates the presence of HPV. The tests quickly and easily identify women who are at risk of cervical cancer, and those women can undergo more expensive and labor-intensive follow-up examinations in a health care facility. Women who do not have the virus need not undergo further testing—freeing up resources for further management of women who are most at risk.

Tell-tale DNA

Reliable testing for HPV DNA is already available in the United States and other industrialized countries. Digene's hybrid capture test for HPV types 16 and 18 (and 11 other strains that most commonly cause cervical cancer) is widely used to help triage women with indeterminate Pap smear results for further examination or routine follow-up.

With assistance from a local contractor, PATH interviewed more than 500 women, health workers, industry experts, and policymakers in both China and India to help Digene produce a list of specifications for redesigning their test to meet the needs of developing countries. By the fall of 2005, Digene's test met all of these standards:

- **Rapid.** The new test yields results in less than two hours, so that women who come to a health care clinic for testing or bring samples in for analysis can receive further management, including treatment if needed, all in the same visit.
- **Accurate.** The sensitivity and specificity of the new test are comparable to those of the industrialized-world version.
- **Easy to use.** Health workers with minimal training can analyze samples in basic laboratory facilities. Samples also can be self-obtained from the vagina with minimal loss of accuracy—or cervical and vaginal specimens obtained by a clinician can be used, when such services are available.
- **Flexible.** All components of the test are designed for laboratories with minimal equipment and resources. The current prototype is portable and can be powered by a battery in areas where electricity is unreliable or unavailable; the reagents used for the test are in dry form and heat-stabilized so that they do not require storage at a specific temperature or humidity; and samples are

read not with a standard luminometer, but by exposure of a strip of film.

- **Affordable.** The new test costs less than US$5 per result, which is less than a fifth of the cost of the industrialized-world version.

Because many developing countries approach screening by testing samples from many women at the same time, the test is designed to process approximately 46 samples at a time. This accommodates campaign-type screening of large groups of women and allows health workers to collect samples from rural areas and test them in batches.

Tracking an HPV biomarker

PATH is working with Arbor Vita to meet a similar set of specifications for a groundbreaking test that detects the HPV biomarker protein E6. E6 is elusive; it is never present in more than very small levels in cervical specimens. But it is worth looking for: not only does the protein mark the presence of oncogenic types of HPV, it likely will indicate active infection—infection that can cause dangerous changes in cervical cells. A test that effectively and accurately identifies E6 could provide a much finer net for cervical cancer screening, with accompanying savings in money, time, and human resources.

The E6 test will be formulated as an immunochromatographic strip test, making it ideal for use in areas without laboratory resources and allowing screening of one woman at a time. PATH's diagnostic group is actively working with Arbor Vita to transfer their E6 research into a strip test format.

Local collaboration on cancer screening

In China and India, PATH has collaborated with local agencies to build programs that provide large quantities of samples to our private-sector partners, so that they can validate their tests. These programs function as cervical cancer screening programs, which is an immediate local benefit. By the end of 2005, approximately 6,500 women in China and 3,000 women in India will have been screened. Starting in 2006, India hopes to broaden its program to include 4,000 women annually, and China's program will expand to include 2,500 women each year. Colposcopy will be performed on each woman, providing a strong evidence base by allowing researchers to measure the specificity and sensitivity of both assays.

Screening nearly 10,000 women in China and India is helping PATH and its partners validate two tests for the virus that causes most cases of cervical cancer.

The Chinese Ministry of Health is currently conducting a large-scale demonstration project (independent of PATH funding) to test cervical cancer screening methods such as Pap smear and visual inspection with acetic acid in specific regions. They have agreed to include Digene's HPV DNA test and Arbor Vita's test for E6, when they are available, providing a true broad-scale field test for the products.

Next steps

Digene is now producing prototypes of the assay that they and PATH will use to validate functionality in a laboratory setting. By early 2007, this assay should be in field testing in both China and India. Plans for commercialization center on the east coast of China, where the device can be made inexpensively and exported to other developing countries. Arbor Vita, together with PATH's expert diagnostics team, is continuing research and development work on the E6 test and hopes to have a prototype ready for field testing by early 2007. ■

REFERENCE

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Responding to HIV and AIDS in Eritrea

Communication and compassion are the keys

Project name
Winning Through Caring

Location
Eritrea

Methods
Communication for social change, peer education, interactive theater, mass media, advocacy

Partners
Family Health International (FHI); HIV/AIDS, Malaria, Sexually Transmitted Infections, and Tuberculosis Control Project (HAMSET); ministries of education, health, information, labor and human welfare, and transportation; Bidho; Eritrean Defense Forces; Federation of Eritrean Workers; National Union of Eritrean Women; National Union of Eritrean Youth and Students; Interfaith Council; Eritrean Chamber of Commerce

Funder
US Agency for International Development (through FHI's IMPACT Project)

For more information
Please contact Michelle Folsom, Africa regional representative, at mfolsom@path.org.

Eritrea faces a daunting legacy from its 30-year liberation war with Ethiopia: widespread poverty, displaced populations, and severely damaged health facilities. Although the country has a relatively low HIV prevalence rate for the region, the Eritrean government has recognized the HIV and AIDS epidemic as one of the gravest threats to national prosperity and has been working to prevent and control the spread of HIV infection since the mid-1990s.

As part of the IMPACT project led by Family Health International, PATH provides technical assistance in behavior change communication (BCC) to the Eritrean government and the World Bank's HIV/AIDS, Malaria, Sexually Transmitted Infections, and Tuberculosis Control Project project, known as HAMSET. Through a highly collaborative process, PATH has designed and, together with the government, launched Winning Through Caring, a comprehensive BCC program in 15 model communities. The program uses peer-facilitated learning, participatory theater, interactive radio, and related activities to reach Eritreans with HIV prevention, care, and support information.

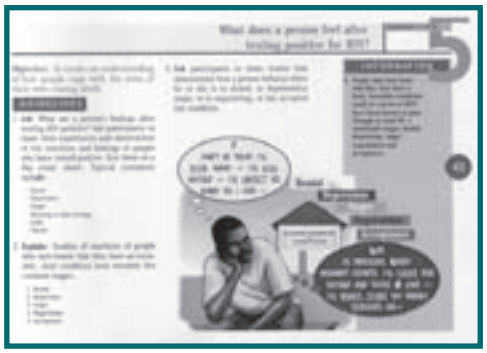
Setting the stage

The project's ambitious goals required a strategy rooted in the cultural values of the Eritrean people—one that would provide a framework for collaboration, capacity building, and a comprehensive set of HIV prevention interventions. Working closely with the Eritrean Ministry of Health (MOH), PATH began by assessing the needs of populations facing the greatest risk of HIV infection. This formative research showed that Eritreans were knowledgeable about HIV and AIDS but that many misconceptions and information gaps existed.

Community stakeholders expressed both compassion and fear toward people living with HIV and AIDS, and they shared a deep commitment to caring for family and community members who acquire HIV infection. PATH and the project partners identified this caring impulse as the defining facet of the social response to AIDS in Eritrea—and the strongest resource in combating fear, stigmatization, and shame.

Encouraging peer dialogue and inquiry

To tap into this culture of caring, the Eritrean government formed peer-facilitated discussion groups in each of the 15 communities that the MOH selected for HIV and AIDS interventions. PATH trained supervisors, peer coordinators, and peer facilitators who led discussions among more than 32,000 high-risk individuals, including women, youth, workers, commercial sex workers, and military personnel. Other partners, such as the Eritrean Catholic Secretariat and the Interfaith Council, also used the project strategy and created learning groups that reached 15,550 church members.



By fostering dialogue and reflection on HIV and AIDS, the Winning Through Caring project—including the Splash! curriculum—is changing the way that Eritreans respond to HIV and AIDS.

To foster deeper dialogue, PATH adapted a process it developed for the IMPACT project in Kenya. Known as Splash!, this original methodology for peer facilitation includes a curriculum and discussion guides that cover basic information about HIV and AIDS. More than just a curriculum, however, the Splash! approach involves small peer groups in a process of intense dialogue and critical reflection, which in turn encourages knowledge, insights, and new behaviors to ripple through the community.

Gathering the groups two to four times each month, the peer facilitators lead interactive discussions on caring relationships and related health topics. The peer facilitators ensure that the discussion quality and levels of audience participation are high. They also invite guest speakers, distribute condoms to those who want them, and refer participants to sexually transmitted infection and voluntary counseling and testing services. Many participants have spoken passionately about the value that these discussions have added to their lives.

Interacting through theater

The Winning Through Caring strategy also incorporates folk media and participatory theater, which are effective and established means of communicating at the local level. PATH introduced magnet theater, which it developed under the IMPACT project. This powerful, participatory form of theater takes place in fixed venues at set times each week. The plays are based on real-life dilemmas and are deliberately left open-ended, providing the community with an opportunity to debate and participate in performances and solutions. To share knowledge about organizing, producing, and evaluating performances, PATH arranged training for local partners, as well as study tours and site visits between Eritrean and Kenyan staff.

Taking messages to the airwaves

To maximize the project's reach, the peer facilitation activities were designed to interact with the mass media and to take issues and ideas from the few to the many. PATH provided guest speakers and ideas for existing radio programs and developed a new program that is about to be launched. Called *Romadi* (the name of a local grass that spreads quickly), the program includes a soap opera and a chat show. The team used a community-based, participatory process to develop the storyline and characters and held several training sessions to develop the writers' and producers' capacity to incorporate HIV prevention and care issues. Radio listening groups will be formed at the local level once the program goes on the air.

To encourage personal reflection about HIV, the project created posters like this one, which reads, "By using condoms we protect ourselves. Let's plan for a bright future."

Bringing it all together

Eritrea has the opportunity to halt the progress of the AIDS epidemic before it exacts a greater toll on the country. The Winning Through Caring strategy has made unique strides toward this goal. BCC activities are now well established in the project's model communities, and the government is already planning to scale up the program. Equally important, the government—which was the project's primary implementing partner—has enhanced its capacity to design, implement, and monitor programs that prevent and mitigate the impact of HIV and AIDS in Eritrea. ■

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Project name
Japanese Encephalitis Project

Location
Asia and the Pacific

Methods
Advocacy, demand and cost-effectiveness analysis, surveillance, technical assistance, technology evaluation, vaccine development

Partners
Ministries of health, World Health Organization, US Centers for Disease Control and Prevention, vaccine manufacturers, International Vaccine Institute, UNICEF, University of Liverpool, Armed Forces Research Institute of Medical Services, World Bank, and nongovernmental organizations

Funder
Bill & Melinda Gates Foundation

For more information
Please contact Julie Jacobson, project director, at jjacobson@path.org.

The only effective way to control JE is through immunization; however, such efforts have been hindered by a lack of diagnostic tests for the disease, inadequate surveillance, and limited vaccine supply. PATH is changing all that by advancing an improved vaccine and helping introduce it into immunization programs in affected countries.

A search for the ideal vaccine

While international travelers and military personnel who go to Asia often are vaccinated against JE, many Asian children do not get this protection. The commonly used vaccine has drawbacks that have hampered its integration into immunization programs: it is time-consuming and expensive to produce, and there is neither enough of the vaccine nor enough funding to immunize all the children in the region who need it—especially since three or more doses are required for full protection.

To find a better solution, PATH contacted vaccine producers in search of an ideal JE vaccine candidate, one that would be:

- Safe and efficacious, even when given with other vaccines.
- Effective in a single dose and therefore easier to introduce into routine immunization schedules and to use in immunization campaigns.
- Easy to produce in large quantities.
- Affordable.

PATH learned that China has immunized more than 200 million children over the last 15 years with an effective vaccine made from active but weakened (attenuated) virus. This SA 14-14-2 vaccine meets many of the criteria for an ideal vaccine, but language and cultural barriers have prevented wide dissemination of information about its potential. To eliminate these barriers, PATH has been sharing information about the vaccine at international meetings and translating available research.

PATH's vaccine development specialists are now assisting the vaccine producer in preparing an application for World Health Organization (WHO) prequalification, an important step in making the vaccine readily available to all affected countries. PATH is also supporting clinical trials to confirm that the vaccine can safely be given with measles vaccine to nine-month-old infants, making it very easy to fit into routine immunization schedules. In addition, PATH is exploring other promising JE vaccine candidates.

Supporting evidence-based decisions

Health officials need information and tools to make evidence-based decisions about JE and immunization. To improve case detection, PATH facilitated the much-needed development of diagnostic tests and organized an assessment to determine which are most accurate and appropriate for use in low-resource settings. The goal is to make sure that governments have the resources they need to define the extent of the JE problem in their countries. Two of the tests have recently become commercially available.

PATH also collaborated with WHO in the development of guidelines for disease surveillance and created the Japanese Encephalitis Prevention Network (www.jepn.org). The network is a web-based platform that allows individual countries in Asia to track and map JE incidence, as well as share data and lessons learned with other countries in the region.

In Indonesia, PATH worked with the ministry of health to establish a surveillance system that encompasses sentinel sites at 15 hospitals in six provinces across the archipelago. Five of the six sites are reporting cases of JE, previously thought to exist in only a few areas. With ongoing monitoring, Indonesia will be able to identify age and seasonal patterns of disease and to better target prevention efforts to the geographic areas and people that most need protection. PATH is working with the ministry of health in Cambodia to set up a similar surveillance system.

To help countries plan interventions, PATH is using available data to model the cost-effectiveness of immunization strategies—either integrating JE vaccine into immunization programs or combining routine immunization with immunization campaigns. We are also creating models that will allow countries to forecast how much vaccine they will need and allow industry to better plan production and pricing, which in turn will help countries consider financing options.

Precedent-setting protection

Increased awareness of JE—including international press coverage of the recent outbreak that killed more than 1,500 children in India and Nepal—is stimulating political will and action. In September 2005, the Government of India made a historic decision to plan the introduction of JE vaccine in all states where JE occurs. PATH is part of the technical team that is working with the government on this initiative to procure an appropriate vaccine, which includes consideration of the live vaccine from China. If India does adopt the Chinese vaccine, it will be one of the first cases of a vaccine being created by a developing country for developing countries.

Further south in Sri Lanka, JE immunization began 15 years ago, but the cost and logistics associated with the commonly used vaccine have become prohibitive. The country has decided to incorporate the SA 14-14-2 vaccine and expand the program. To help other countries benefit from Sri Lanka's experiences, PATH will work with the ministry of health to document the planning process, costs of transition (including anticipated savings), results of the introduction, and lessons learned.

On the fast track

Increased awareness of JE, combined with greater availability of information on the SA 14-4-2 vaccine, has been pivotal in galvanizing the political will to tackle this devastating, often lethal, disease. PATH, WHO, and other partners will continue to help speed the availability of improved diagnostic tools and an improved vaccine and to offer information, tools, and technical assistance to government health ministers and frontline workers. On an international level, PATH will advocate for JE prevention by sharing information and country experiences as well as by supporting additional vaccine trials. Our goal is to make sure that children in Asia are protected early in life by a safe, efficacious, and affordable vaccine. ■

Children in China already receive a vaccine for Japanese encephalitis. PATH is helping children throughout Asia get the same protection.

Tools to control Japanese encephalitis

PATH has developed an array of tools aimed at stopping Japanese encephalitis. This page highlights resources that strengthen advocacy and decision-making efforts. Visit www.path.org/je for more information about these and other resources.

E-learning for decision-makers

The Advanced Immunization Management (AIM) e-Learning tool helps national immunization managers, in-country partners, and other decision-makers make well-informed decisions regarding new vaccine introduction and financing.

Produced by PATH and Stanford University's Medical Media and Information Technologies program, the AIM e-Learning tool now includes an interactive module on integrating Japanese encephalitis vaccine into national immunization programs. It includes information on available vaccines and describes how to assess disease burden, introduce Japanese encephalitis vaccine, and monitor and evaluate immunization programs. The module can be found under the topic "Considerations for Introduction of New and Underutilized Vaccines" and is available in English, Chinese, and Indonesian.

AIM modules are also available on immunization financing and introducing hepatitis B vaccine. Modules on rotavirus and meningococcal vaccines will be available in early 2006. To learn more, visit AIM online at http://aim-e-learning.stanford.edu or contact Anne McArthur, senior program associate, at amcarth@path.org.

A web-based network

The Japanese Encephalitis Prevention Network is a web-based platform through which countries in Asia can track and map Japanese encephalitis incidence and share data and lessons learned with other countries in the region. Sri Lanka and Thailand already have fully developed sites, and more country sites are under development. Visit www.jepn.org to learn more.

Shadow Lives

This seven-minute film describes the human toll of Japanese encephalitis through the eyes of Somanna, Mahesh, and Shekaramma—children disabled by the disease—and their families. Produced by PATH and directed by Mahesh Nair, *Shadow Lives* was filmed entirely on location in India and was designed to raise awareness of the disease. It is available for download at www.path.org/je. For DVD copies, contact jeproject@path.org.

Kill or Cure?

PATH recently partnered with Rockhopper TV to develop three documentaries for the BBC series *Kill or Cure?* on three of the world's most devastating diseases: Japanese encephalitis, cervical cancer, and *Haemophilus influenzae* type b. The programs explore individuals' susceptibility to disease and their chances of survival as well as the latest cutting-edge prevention tools, cures, or control measures. After airing on BCC World in late 2005, these films will be available on DVD. Contact info@path.org or visit the PATH website for information.

Correction: We regret to report an error in the August 2005 issue of *Directions* (volume 2, issue 2). In the first paragraph of the African Youth Alliance article, "the estimated 7,000 HIV infections" should have read "the estimated 7,000 HIV infections that occur each day." We apologize for any resulting confusion.

PATH is an international, nonprofit organization that creates sustainable, culturally relevant solutions that enable communities worldwide to break longstanding cycles of poor health. By collaborating with diverse public- and private-sector partners, we help provide appropriate health technologies and vital strategies that change the way people think and act. Our work improves global health and well-being.

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