



CDC Global Health

GLOBAL HEALTH RESEARCH HELPS SAVE LIVES

E-Brief
3RD QUARTER 2009



Residents of the Field Epidemiology Training Program in Thailand dissect bat samples during a leptospirosis outbreak investigation. Operations research helps CDC understand the root cause of an outbreak and prevent additional illness.

WELCOME to 2009's third quarter *Global Health E-Brief*, designed to inform readers about key global health activities at the Centers for Disease Control and Prevention (CDC). This issue highlights CDC's global health research. Looking for ways to ensure efforts maximize health and economic impact, CDC conducts research to evaluate, compare, and

improve health programs and policies at every stage — from initial planning and design through implementation under often-challenging field conditions in country. Research, particularly operations or applied research that takes science from “laboratory to field” is one of CDC's core contributions to the field of global health. 

In This Issue

- pg 2 Asking the Right Questions Leads to Effective TB Treatment in People With HIV
- pg 3 CDC Research Looks at How to Make Rotavirus Vaccines More Effective in Developing Countries
- pg 4 Not Just Blowing Smoke: Simple, Low-Cost Changes Reduce Respiratory Disease in Kenyan Children
- pg 5 CDC Costing Study Helps Ensure Sustainability of Global HIV Care and Treatment Programs
- pg 6 With Findings from CDC Research, Africans Use Rapid Diagnostic Tests to Effectively Treat Malaria
- pg 7 Improved Routine Immunization Means More Children Protected from Disease in Assam, India
- pg 8 Newsbytes

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U.S. DEPARTMENT OF HEALTH AND HUMAN SERVICES
Centers for Disease Control and Prevention
Coordinating Office for Global Health



CS205169

Asking the Right Questions Leads to Effective TB Treatment in People With HIV

CDC researchers have found that asking about the right combination of symptoms can be an effective tool to screen people with HIV for tuberculosis (TB). This relatively simple intervention is easily done in even the poorest, most resource-limited settings.

Hospital wards in Cambodia were once overwhelmed with people dying of AIDS. Today, with support from the President's Emergency Plan for AIDS Relief (PEPFAR), Cambodian hospitals are seeing far fewer patients in such dire condition. Cambodians with HIV have better access to treatment and not only live longer, but are able to support their families.

Unfortunately, misdiagnosis of TB, a common disease for people with HIV, threatens many of the gains made by PEPFAR. TB is the most common cause of death for people with HIV. With early diagnosis and treatment, many of the deaths associated with TB could be prevented.

The World Health Organization (WHO) recommends that individuals with HIV be screened for TB when they are first diagnosed with HIV and periodically thereafter. Diagnosing TB in people

with HIV can be difficult because they are more likely than persons who do not have HIV to have extra-pulmonary TB and to lack "classic" TB symptoms, such as chronic cough. In addition, the two most common tests for TB (chest x-ray and examination of sputum under a microscope) often fail to detect TB in people with HIV. One common approach, never studied for effectiveness, was to conduct further tests only if the person reports coughing for 2-3 weeks.

CDC, with financial support from the U.S. Agency for International Development (USAID) and PEPFAR, conducted a study to determine

how best to screen for TB among people with HIV, even in the poorest, most resource-limited areas of the world. Working with local doctors and nurses, and the Ministries of Health in each country, CDC researchers enrolled 2,000 people with HIV in Cambodia, Vietnam, and

Thailand. For each individual, scientists performed specialized TB tests—not usually available in countries with limited resources—to confirm the diagnosis of TB with as much certainty as possible. With this information, researchers then tested whether less resource-intensive methods, such as asking questions about specific symptoms, would be effective in diagnosing TB.

The results showed that 75% of TB diagnoses were missed if people were asked only about whether they had a cough for at least 2 weeks. If health care workers asked about three specific symptoms (cough, fever, and night sweats), however, the percentage of TB diagnoses missed dropped to less than 10%.

Persons who reported having none of the three symptoms did not need additional tests and could be started safely on HIV treatment and TB prevention medication. Persons who reported one or more symptoms received additional tests.

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Part of the study team at Sereysophon Referral Hospital in Banteay Meanchey Province, Cambodia, along with CDC staff. This site was the first to enroll patients in Cambodia. The success of the study in achieving its goals is attributed to the hard work of staff at this and other hospitals that participated.

Photo by Kevin Cain, CDC



approach to accurately screen for this deadly disease even in very resource-limited settings. This will not only have a dramatic impact on the life of individual patients, but also affect families and the population of small villages overall,” said Dr. Kevin Cain, a CDC expert on tuberculosis. “It was a heartwarming experience to be able to improve the diagnosis of these patients and give them a chance to recover from TB.”

These promising results have encouraged health officials in Cambodia, Vietnam, and Thailand to revise their national guidelines for TB screening and diagnosis in people with HIV. The revised national guidelines will end the use of chronic cough alone for TB screening, which misses too many patients with TB to be useful, and will replace it with screening based on multiple symptoms, such as those identified in this study. CDC is also working with the World Health Organization to incorporate these findings and other research into a new global policy on how people with HIV are screened for TB. 🌐

CDC Research Looks at How to Make Rotavirus Vaccines More Effective in Developing Countries

“We in the developed countries often take vaccines and vaccination for granted, but children in many resource-poor, developing countries are still dying of vaccine-preventable diseases. That is the hardest and most important lesson I have learned.”

—Dr. Baoming Jiang

CDC’s Dr Baoming Jiang (sitting) conducts an in-country consultation in Vietnam with representatives of PolyVac, a vaccine manufacturer in Hanoi, Vietnam.



Photo by: Baoming Jiang, CDC

Thanks to the efforts of CDC research microbiologist Baoming Jiang and colleagues, the day is coming when developing countries will have vaccines effective against indigenous strains of rotavirus.

Rotavirus is the leading cause of severe diarrheal disease in children worldwide and causes the deaths of nearly 1,400 children each day in developing countries. The severe dehydration caused by rotavirus is easily treated in the United States and other developed countries, but an effective vaccine is the key to saving lives in the developing world.

Two oral rotavirus vaccines available since 2006 have been shown to be effective in developed

countries in the Americas, Europe, and Australia, but they have been less effective in preventing hospitalizations and deaths from rotavirus disease in developing countries. Possible reasons include the presence of other enteric infections and persistent levels of malnutrition. Furthermore, many developing countries don’t have the technology and resources needed to make and use the oral vaccines.

Supported by an array of partners, including the World Health Organization

(WHO), Program for Appropriate Technology in Health (PATH), United Nations Children’s Fund (UNICEF), the Bill and Melinda Gates Foundation, and the Global Alliance for Vaccines and Immunizations, Jiang and vaccine manufacturers in China, India, and Vietnam are working to better understand the reasons for the reduced effectiveness and how to modify the vaccines so that they are effective.

CDC is also collaborating with partners to develop a needle-less micro-patch to deliver rotavirus vaccine. This technology may make it easier to vaccinate large populations during immunization campaigns. All of these efforts are essential for progress in developing improved

vaccines that protect children against local strains of rotavirus, and are less expensive and therefore more available to those who need them most.

Jiang has been involved in the development of rotavirus vaccines for children in developed and developing countries for more than 17 years. For Jiang, vaccine research is “a

noble profession that saves hundreds of thousands of lives each year.” His contributions to vaccine development were recently recognized in the journal *Nature Reviews Drug Discovery* (www.nature.com/nrd/journal/v7/n5/full/nrd2587.html). 🌐

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Not Just Blowing Smoke: Simple, Low-Cost Changes Reduce Respiratory Disease in Kenyan Children

CDC has joined a cadre of partners to reduce the risk of respiratory infections and pneumonia in children in rural western Kenya. Village by village, CDC, the World Health Organization (WHO) and Kenyan partners are showing how the use of a simple and relatively low-cost intervention clean-burning cook stoves – can help prevent pneumonia and improve health and economies in sub-Saharan Africa.

Few know that pneumonia kills approximately 2 million children under the age of five years, worldwide each year. Resource-poor countries are particularly hard hit—for every child who dies of pneumonia in a developed country, more than 2,000 children die of pneumonia in developing countries.

WHO reports that indoor smoke from solid fuels is 10th on a list of 26 risk factors contributing to the global burden of all disease. Indoor smoke released from fuels used to cook and boil drinking water is the main risk factor for one-third of pneumonia infections. The problem is particularly evident in sub-Saharan Africa where

1 in 3 young children are reported to have pneumonia each year and up to a third of pneumonia deaths are attributed to indoor smoke released from fuels used during cooking.

In the villages of rural western Kenya, traditional open fire pits are used in homes for cooking and heating. As is tradition, women often keep their young children nearby while cooking, and family members sometimes sleep in cooking rooms which may not vented to the outdoors. As a result, all breathe in particulate matter—carbon monoxide, greenhouse gases, and other pollutants. A 2007 survey CDC conducted in Kenya's Nyanza Province found a heavy burden associated with respiratory diseases. Parents reported that nearly a quarter (22%) of children younger than age 3 had experienced an acute respiratory infection in the previous 24 hours.

To address the problem, CDC partnered with WHO, the Kenya Ministry of Health, the Safe Water and AIDS Project (a Kenyan non-governmental organization), and GTZ (a private international enterprise that works with the German government to improve people's living conditions on a sustainable basis) to encourage the use of locally crafted low-cost, clean-burning stoves (Jiko Kisasa stoves) in 10 Kenyan villages. Unlike the traditional fire pits, the clean-burning stoves contain the fire

and help to prevent release of particulate matter into the air.

CDC scientists collected data in the project's 10 villages to learn more about health and spending priorities and how social networks can spread the word about new technologies in resource-limited settings. Researchers used Google Maps to plot

where stoves are bought and installed. Particulate monitors in homes track changes in the air quality after installation and use of the stoves. Researchers interviewed members of more than 1,000 households in 59 villages. Pneumonia was reported as the second most commonly reported health problem among children, and cooking fuel was the sixth most common expenditure of households.

Kenyans in homes using the stoves reported fewer respiratory illnesses. The project has had economic benefits as well. Project organizers have helped financially vulnerable women use their social networks to promote and sell the stoves—creating a new source of income for these women. Stoves cost about US\$3-4 and require less fuel than open fire pits, enabling families to use their limited income for other needs, including healthcare and education.

One villager praised her new stove: "I no longer have concern about my children's health while cooking with the new Jiko stove. It produces less smoke so my children will not be sick, and it cannot burn my children."



Rates of acute respiratory infections in children are high in Kenya. Mothers typically have their babies and young children with them while cooking and many also sleep in the cooking room.

Photo by: Bobbie Person, CDC

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The project continues to scale up with a goal to reach families in 50 more villages in rural western Kenya within the year. Monitoring of respiratory disease in this region will continue, along with collection and evaluation of data on presence of particulate matter in households with properly installed cooking stoves. This information will inform the effectiveness of the program and help to prioritize future sites. CDC and the other implementing partners are also collecting information about consumer use and satisfaction with the clean-burning stoves and testing social marketing approaches in different villages to ensure that lessons learned and best practices are incorporated as the project expands. 🌍

CDC Costing Study Helps Ensure Sustainability of Global HIV Care and Treatment Programs

Over the past five years, more than 2.1 million men, women, and children around the world have received life-saving treatment for HIV with support from the U.S. President’s Emergency Plan for AIDS Relief (PEPFAR) program. Every month, PEPFAR helps provide access to HIV treatment for 60,000 new people who would otherwise have few or no options for addressing their HIV disease. One of the most important treatment options in the battle against HIV/AIDS has been the use of antiretroviral therapy (ART)—the use of at least three antiretroviral (ARV) drugs to stop the progression of disease.



This baby is receiving ART; evaluating the cost effectiveness of ART programs in Africa and elsewhere in the world will help make the programs stronger saving future generations like this baby.

Photo by: Susy Mercado, CDC

As a key implementing agency in PEPFAR, CDC leads the coordination of PEPFAR’s applied (or operations) and effectiveness research, which measures the outcomes and impact of PEPFAR interventions to inform future program design and to ensure efficient use of resources.

Now more than ever, country programs need robust data on treatment costs—and ultimately care and prevention program costs—to continue treatment scale-up and maintain balanced programs.

Today, CDC is leading an advanced economic evaluation of HIV treatment throughout PEPFAR countries. This type of evaluation will help countries and donors plan and use resources effectively to continue to improve and maintain these HIV treatment programs over many years.

In 2006, when new HIV treatment programs were being scaled-up across Africa, CDC developed the first multi-country ART costing study for PEPFAR, which assessed ART

program costs in more than 45 health facilities in Nigeria, Ethiopia, Uganda, Botswana, and Vietnam. Findings from the study provided a breakdown of the major costs associated with new ART programs and the average annual per-patient treatment cost across multiple agencies, partners, and facilities. This effort allowed Ministries of Health and PEPFAR country teams to project treatment costs under different funding and care scenarios, leading to more strategic decisions that help to ensure long-term sustainability of the treatment programs in these countries.

PEPFAR is now expanding this effort to conduct a PEPFAR-wide ART costing initiative, which includes:

- reviewing each PEPFAR country team’s understanding of the economic and clinical aspects of its ART program;
- sharing sophisticated methods for determining the comprehensive costs of the treatment programs; and
- helping country teams to use costing information and modeling to determine the capacity of the PEPFAR program and countries to maintain ART for individuals who are currently receiving treatment, and to enroll new patients.

“Because of the recent global economic downturn, understanding the cost of ART is critical”, says Dr. John Blandford, a senior CDC health economist and principal investigator of the study. “Ministries of Health are facing severe budget constraints and donor resources have flattened. Now more than ever, country programs need robust data on treatment costs—and ultimately care and prevention program costs—to continue treatment scale-up and maintain balanced programs.”

The advanced economic analysis takes into account some of the issues faced by treatment programs as they mature, including decreasing costs for existing antiretroviral drugs, introduction of newer, better therapies into the market at a higher price, and the need to move people over time to more expensive second-line regimens as resistance to first-line drugs develops.

Once final data are available, countries can estimate their total treatment costs and major cost drivers of ART under different scale-up scenarios, such as meeting the goal of universal access to ART. In so doing, countries can anticipate future resource needs and leverage additional donor support, such as from the Global Fund to Fight HIV/AIDS, TB, and Malaria. Furthermore, the cost projection information will help shape PEPFAR Partnership Frameworks, the 5-year strategic frameworks for cooperation between U.S. and host partner governments focused on securing long-term sustainability of HIV/AIDS programs.

In 2009, CDC is supporting 124 country-specific program evaluations and six multi-country public health evaluations, the latter which will answer key program-wide questions on preventing mother-to-child transmission of HIV, tuberculosis, health systems strengthening, and HIV counseling and testing. 

With Findings from CDC Research, Africans Use Rapid Diagnostic Tests to Effectively Treat Malaria

CDC research is helping to find the best ways to use new rapid diagnostic tests in Africa to help save lives and scarce resources.

Rapid, accurate diagnosis of malaria historically has been difficult. Until recently, the only way to diagnose the disease was for a skilled laboratory worker to use a microscope to look for malaria parasites in a blood sample. Unfortunately, many facilities had neither the microscope nor adequately skilled staff. So a mother who brought her ill child to a clinic in sub-Saharan Africa with symptoms of fever and headache often was simply given antimalarial medication. There were two problems with that approach: the child might not have malaria and wouldn't improve, and overuse of antimalarial drugs can lead to drug resistance, causing the currently useful drugs to become ineffective.

Availability of rapid diagnostic tests (RDTs) has allowed health workers to determine in as little as 15 minutes whether a patient has malaria. As a result, workers can treat children and adults with effective antimalarial drugs or look further for the cause of illness. Ultimately, the result is fewer complications and deaths.

Many malaria-endemic countries have started to use RDTs, and CDC has collaborated with local research institutions in Kenya and Tanzania to learn

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more about how best to use these tests in routine patient care. Although rapid, the tests are not necessarily simple to perform, require storage at the right temperature and humidity, and produce results that are not always accepted by health workers, largely because older guidelines from WHO called for treatment without diagnosis, a lack of experience in using RDTs, and changing national malaria treatment guidelines.

Health worker in Tanzania performing a rapid diagnostic test for malaria.



Photo by: S. Patrick Kachur, CDC

Recent studies showed that after the new tests were introduced, health workers needed training to use the tests appropriately. A CDC study in rural Tanzania found that, despite training and supervision, some health workers did not perform the tests correctly or use the results to influence treatment decisions. Another study in Kenya showed that use of RDTs did not improve treatment of malaria cases. Instead of increasing the number of people tested at a clinic, fewer people with malaria symptoms were tested. Both studies signaled the need to understand more about why health workers were not using RDTs and how best to encourage their appropriate use.

Recent research conducted in 2008 by CDC scientists in Tanzania has found that health workers at outlying health facilities successfully use RDTs to improve care when they receive appropriate supervision and RDT quality control procedures are followed. As a result, the Tanzanian National Malaria Control Program will take steps to improve supervision and quality control of malaria RDTs nationwide.

With the proper supports in place in health facilities, public health officials are encouraged that the use of RDTs will improve diagnosis of malaria and effective treatment for individuals – another step forward in the battle against malaria.

Dr. Larry Slutsker, who leads CDC’s malaria program, is pleased with the progress in effective use of the rapid tests.

“We need to have accurate malaria diagnosis—for better case management of sick people and to track our progress in controlling this disease. RDTs will play an important role in these efforts.” Malaria causes approximately 500 million infections and more than one million deaths annually; most deaths occur in young children. Although about one-half of the world’s population is at risk for malaria, 90% of the cases and deaths occur in sub-Saharan Africa. 🌍

Improved Routine Immunization Means More Children Protected from Disease in Assam, India



CDC Public Health Advisor Tove Ryman presents at a RED training in Assam, India.

Photo by: Tove Ryman, CDC

A recent CDC-led intervention to improve routine immunization coverage in the state of Assam, India, resulted in vaccination of 12,000 children to prevent infectious diseases—a 29% increase in coverage in one district.

Assam is famous for its tea estates and rich in natural resources and culture, yet still lacks basic infrastructure to effectively deliver healthcare, including routine immunizations for children. Immunizations are critical to reducing morbidity and mortality caused by diseases such as measles, polio and tetanus.

The major barriers to routine immunization are common throughout India: lack of trained health care workers and supervisors, shortages of vaccine, and power outages that render vaccines ineffective when refrigeration fails. For these reasons, each year an estimated

9.7 million Indian children are only partially vaccinated by the age of one year, and remain vulnerable to disability and death from serious infectious diseases.

To improve routine immunization coverage, CDC partnered with United Nations Children’s Fund (UNICEF) and the government of Assam to implement and evaluate the effectiveness of the Reaching Every District (RED) intervention. The project trained program staff from eight districts in Assam in the essential elements of a successful immunization campaign:

- Supportive supervision
- Outreach vaccination sessions
- Strong links with communities
- Planning and management of resources
- Monitoring for action

“For the first time, we established a baseline so that we can most effectively measure the impact of the RED strategy.”

Two of the eight districts were selected as focus districts, and each was supported by a full-time UNICEF consultant. CDC public health advisor Tove Ryman helped establish the project and visited each focus district to launch the intervention. During the year-long intervention CDC conducted quarterly site visits.

One year after implementation, the results are exciting and promising. The number of fully vaccinated children

increased in every district that received the RED intervention. In Barpetta, one of the focus districts, the percentage of children vaccinated increased by 29 percent among children ages 12-23 months. Barpetta also had improvements in program record-keeping and recording, calculating and interpreting information, frequency of supervision, and increased numbers of outreach sessions and links with communities.

One immunization worker in the district described the impact of the intervention this way: “Now we can calculate our coverage and also find dropouts. And we communicate better with people than before.”

Ryman noted that “For the first time, we established a baseline so that we can

most effectively measure the impact of the RED strategy.” She adds, “It was really rewarding to see the quality of the program enhanced as a result of the intervention.”

The lessons learned in Assam are now being put into practice by CDC and partners in the populous Indian states of Jharkhand and Bihar. One finding was that many of the staff delivering immunization services had not received any job-related training. Trainers now conduct skill-building exercises at a very basic level. CDC and UNICEF also learned that training was more effective when broken into modules taught over time, rather than in one long session. Now, trainees practice new skills and then review them with trainers. 

Newsbytes

WHO: Elimination of River Blindness Possible in Africa

Results of a World Health Organization study published in the open-access journal PLoS Neglected Tropical Diseases presents the first evidence that treatment with ivermectin may help the world eliminate onchocerciasis (river blindness). Mass ivermectin treatment has been widely accepted as a proven strategy to control the disease and, in Latin America, ivermectin twice-annual treatments have interrupted transmission in a number of areas. Until now, however, there has been no evidence in Africa that ivermectin could interrupt transmission of the parasite and eliminate the disease in endemic areas. The WHO study showed that after 15-17 years of annual treatments, only a few infections remained in humans. Because transmission levels were below the threshold required for elimination, treatment was stopped in test areas; follow-up evaluations after 1.5 to 2 years found no further infections or transmission. The authors report that the findings are evidence, in

principle, that onchocerciasis elimination is feasible in Africa. Further studies are necessary to determine whether transmission recurs and under what circumstances.

To view the news release visit WHO: www.who.int/mediacentre/news/releases/2009/river_blindness_20090721/en/index.html

To view the study visit PLoS Neglected Tropical Diseases: www.plosntds.org/article/info%3Adoi%2F10.1371%2Fjournal.pntd.0000497

CDC Assigns Epidemiologist to WHO China for Assistance to Eradicate Hepatitis B Virus

With support from the ZeShan Foundation, a family foundation concerned with the prevention and treatment of HIV/AIDS and Hepatitis B, CDC has assigned Dr. Yvan Hutin to the World Health Organization (WHO) China Office. Hutin will work with China and other countries

in WHO’s Western Pacific Regional Office to reduce early childhood hepatitis B virus (HBV) infections from more than 8% to less than 2% by 2012. HBV deaths in the region, primarily from cirrhosis and liver cancer caused by chronic infection acquired at birth, account for more than 50% of the world’s HBV deaths.

CDC Supports Preventing Violence against Children Study in Tanzania, Zanzibar



Violence against children is an urgent public health issue in Tanzania. Reports indicate that 31% of girls and 25% of boys in Tanzania have experienced at least one incidence of sexual violence before the age of 18

At the request of the United Nations Children's Fund (UNICEF), CDC is providing technical assistance to conduct a national survey on violence against children in Tanzania and Zanzibar. Data from the survey will be used to identify the national prevalence of violence against children in Tanzania and Zanzibar; risk and protective factors for victimization; and health outcomes of such violence. Findings from the survey will be used to inform policy and program development on the prevention of violence against children. The CDC team will begin interviewer training and data collection in the two countries in October 2009.

For more information, visit Global Violence Prevention at:

www.cdc.gov/ViolencePrevention/globalviolence/index.html

November 2, 2009, is World Pneumonia Day

Major health and humanitarian relief organizations are joining forces to coordinate education outreach, walks, runs and policy summits in New York, Washington DC, Kenya, Nigeria, India and Bangladesh on November 2nd to increase awareness that preventing pneumonia saves lives.

For more information, visit:

www.WorldPneumoniaDay.org

Learn more about pneumonia in a special Notice to Readers in the November 2nd, 2009 issue of the *Morbidity and Mortality Weekly Report* (MMWR) at:

www.cdc.gov/mmwr



For every 1 child that dies of pneumonia in an industrialized country, more than 2000 children die of pneumonia in developing countries. World Pneumonia Day on November 2nd will bring worldwide awareness of this disease so that it may be eradicated one day.

Burma Ministry of Health Launches the DOTS PLUS Program for Management of Multidrug-Resistant Tuberculosis

The Ministry of Health of Burma recently launched the DOTS PLUS for Multidrug-Resistant Tuberculosis Management Program. DOTS PLUS is the internationally recommended strategy for treating drug-resistant tuberculosis that builds upon the standard program for treating drug-sensitive tuberculosis—DOTS (Directly observed therapy, short-course). The launch was made possible by the collaboration and support of multiple private and public partners and donors, including the World Health Organization (WHO), United States Agency for International Development (USAID), United Nations Children's Fund (UNICEF), and others. CDC employees who helped advance the collaboration included Dr. John MacArthur, on detail to USAID's Regional Development Mission in Asia, who oversaw USAID's participation in this collaboration, and Dr. Jay Varma, who provided technical assistance to USAID and the U.S. Embassy in Burma on assessment and implementation. The first patients enrolled in the program began receiving treatment in July.

For more information visit WHO TB:

www.who.int/tb/dots/en



Dr. John MacArthur (USAID, on detail from US CDC), and Dr. Hans Kluge, Medical Officer-TB, (WHO/Burma) see the first patient receive TB medications as part of the DOTS PLUS program.

CDC Helps Advance Public Health Management and Leadership in Ghana

CDC provided technical assistance to help launch the Centre for Leadership and Management at the University of Ghana School of Public Health. CDC collaborated with University of Ghana School of Public Health to develop a detailed curriculum, lesson plan, course schedule, and instruction for the Centre's four-week course entitled "Improving Management of Public Health Interventions." Twenty-two public health professionals from Ghana, Kenya, Tanzania and Uganda attended the course held at the University of Ghana School of Public Health June 22-July 17. Faculty members included representatives from the World Health Organization (WHO), African Field Epidemiology Network (AFENET), Field Epidemiology and Laboratory Training Program (FELTP), the Ghana Health Service, the Ghana School of Public Health and CDC. The Ghana Health Service has now adopted the program for senior leadership training.



Managers of health districts and hospitals in Ghana, Kenya, Tanzania and Uganda participate in the Project Management workshop, facilitated by CDC Training Specialist Denise Traicoff.