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**Release Time: Wednesday, April 3, 1996 4:00 PM EST.**

**Released from Washington, DC and London**

*Jacqueline Cattani, Ph.D. , expert on malaria and the net tests discussed in this press release, will be in Washington on April- 1-3 for interviews. Please call 703 820 2244 to schedule time.*

## **LARGEST TRIALS EVER SHOW MOSQUITO NETS COULD SAVE 500,000 AFRICAN CHILDREN A YEAR - AT VERY LOW COST**

Two of the largest trials of mosquito nets ever carried out show that the lives of some 500,000 African children might be saved each year from malaria if the nets, treated with biodegradable pyrethroid insecticide, were widely and properly used.

The new trials show that use of the nets -- which are treated with biodegradable pyrethroid insecticide -- effectively protected sleeping children from malarial mosquitoes, resulting in dramatic reductions in deaths among children under five years of age. Deaths were reduced by one third in Kenya and by one sixth in Ghana, the two countries where the trials were carried out.

The trials were initiated and funded as a joint effort by the United Nations Development Programme/World Bank/ World Health Organization Special Programme for Research and Training in Tropical Diseases (TDR).

"These are very exciting results," said Ebrahim Samba, M.D., Director of the African Regional Office of the World Health Organization (WHO) in Brazzaville, Congo -- where an international meeting recently reviewed the trials, and called for a "phased and continuously monitored introduction of impregnated nets" against malaria.

Malaria is easily the biggest public health problem in Africa, causing more than 1 million deaths annually. The disease is caused by a parasite transmitted by the bite of mosquitoes -- generally *Anopheles gambiae* in Africa -- which bite during the cool hours of darkness. Until the 1990s, however, control efforts remained weak even as the prevalence of malaria continued to spread and worsen.

In the Kenyan trials, the nets not only saved lives but also led to a 40 percent reduction in hospital admissions for severe malaria -- indicating that nets could reduce the burden on health services.

"Malaria is the single largest cause of hospital attendance in children in Kenya, and any substantial reduction in incidence would make a tremendous difference to the health services because health resources are so limited," said Bob Snow, Ph.D., of the Kenya Medical Research Institute in Kilifi. Dr. Snow was responsible for the Kenyan trial.

While public health experts foresee substantial social, logistic and economic problems in distributing the nets and re-impregnating them on a regular six-month or yearly basis, the new results are being widely welcomed. African ministers of health have already endorsed the use of the nets.

According to Kazem Behbehani, Ph.D., Director of WHO's Division of Control of Tropical Diseases, "the nets should find a very important place in 38 African countries who have established and begun to implement national malaria control plans."

Results of the two trials are to be published in the April 5 issue of **Tropical Medicine & International Health**, a European journal. A third large-scale trial in The Gambia showed a life-saving potential of 25 percent. The results of a fourth study, conducted in a highly malarious area of Burkina Faso, are currently being analyzed, expected to be available in the summer of 1996.

"These four trials have involved half a million people and 20 research institutes and donors, and have tested the use of these nets in different areas, with different malaria risks," said Jacqueline Cattani, Ph.D., of TDR. "They are the most demanding field studies ever undertaken by TDR -- and at nearly \$5 million, the most expensive."

Villages were picked at random to receive or not to receive the nets, and followed for malaria cases for two years. Scientists who studied the effects covered almost all relevant disciplines -- and included epidemiologists, demographers, parasitologists, clinicians, entomologists, social scientists, economists, health educators and health policy specialists.

"The goal was to test widely the results from a small study in The Gambia in 1990," Dr. Cattani said. "And indeed, with these wider results, public health officials can now see impregnated nets are a very cost-effective tool for fighting malaria."

Initial TDR economic analysis estimates that investment in nets would be comparable with global immunization programs for tetanus, measles and polio. Governments may ask users to pay the costs. Nets can be bought for \$5 - \$10, and insecticide sufficient to last for a year between \$.50 and \$1.

Africans already spend comparatively large amounts of money to protect themselves from mosquitoes. In some regions where annual incomes are \$300 - \$400, residents have been estimated to spend up to \$65 yearly on protective items and on coils to keep the mosquitoes out of their homes. This would be like an American family with a \$30,000 per year income spending \$6,000 on insect repellent.

However, in The Gambia, an attempt at "cost recovery" -- asking people to make a contribution to pay for the insecticide -- reduced re-impregnation rates for the bednets from 70 percent to 18 percent.

While such nets have been widely used throughout the world, particularly in Asia, they are still rare in Africa. According to the WHO African Regional Office (AFRO) in Brazzaville, Congo, some 22 of the region's 46 countries have introduced impregnated bednets in recent years -- but only on a small scale.

"Most people in Africa have heard of mosquito nets, but only one in 20 use them, except near swamps and irrigation dams or channels where their bites are really irritating," says Christian Lengeler, Ph.D., a Swiss Tropical Institute scientist who coordinated the trials for TDR.

People's attitudes about the nets are already changing. According to Fred Binka, M.D., coordinator of the Ghana trials: "In Northern Ghana, where we held the trials, the communities are still very traditional, and when we began bednets were very rare. But now they have become a feature of every household. Proper drug treatment is not easily available to them, and they recognize that here is a way to save their children's lives." Dr. Binka estimated that when the bednets were used, between two and three children slept under each net.

Malaria scientists familiar with the net tests pointed out that the nets may influence the rate and timing of the acquirement of natural immunity to malaria, and the effect of the nets on older age groups must be carefully monitored during their introduction.

"Evidence is now available for most stable malaria settings in Africa, but more information is needed on areas with epidemic malaria and the highest levels of perennial transmission," the scientists say.

The effects measured by the trials are considered "realistic" as they were achieved despite the fact that, for example, in Ghana only 72 percent of the people actually used the nets in the wet season, and

only 50 percent in the dry season -- even though the nets and insecticide were provided free of charge.

A few concerns have already been voiced. For example, could the nets simply delay the onset of malaria immunity, so that the children saved under the age of five will simply die when they get malaria later? Some experts consider that possible, but others point to experience with protecting young children with chemoprophylaxis -- regular antimalarial drugs -- which shows that even though such children do get more malaria when they stop the drugs, their age and strength then makes them more able to survive it. Moreover, the nets may be working not by stopping malaria in the children altogether, but by reducing the frequency of severe and fatal infections -- thus allowing immunity to develop. But these matters will need to be watched, particularly in areas where transmission is low, and immunity slow to develop.

Another question will be whether the mosquitoes will develop significant resistance to the pyrethroid insecticides, as they did to DDT in the 1950s and 1960s. Eventually they will, the experts say. Resistance is already reported among certain "nuisance" mosquitoes, the *Culex* species, and in isolated instances among *Anopheles*. Moreover, pyrethroids are also used in agriculture, causing further exposure and potential selection of resistant varieties. Presently resistance is not considered an operational issue.

What's now needed, according to trial coordinator Christian Lengeler, is more active interest, attention and marketing of the nets by the public sector -- by providing information through schools, and to women when they visit primary health care centers during pregnancy. Since pregnant women are excluded from many treatments for fear of affecting the fetus, nets could be provided to them at such visits and could become one of the few disease interventions actually targeted for pregnant women -- who are also at risk of increased malaria as pregnancy reduces immunity -- as well as to their children.

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*Organizations contributing to the trials included the International Development Research Center (IDRC) in Canada, the Overseas Development Administration (United Kingdom), the Medical Research Council (UK), and the Wellcome Trust (UK), along with agencies and health ministries from Denmark, The Gambia, Ghana, Italy, and Kenya, and international bodies such as UNICEF and WHO. The trials were coordinated and funded by the UNDP/World Bank/WHO Special Programme for Research & Training in Tropical Disease (TDR), WHO. A fifth trial, begun later with the support of the United States Agency for International Development (USAID), is under way in a highly malarious region of West Kenya.*