

**Report of the first meeting of  
WHO Strategic and Technical Advisory Group  
on Neglected Tropical Diseases**

**Geneva, Switzerland, 17–18 April 2007**



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### **Welcome and opening address**

The meeting was opened by Dr David Heymann, Assistant Director-General for Communicable Diseases and Representative of the Director-General for Polio Eradication, who welcomed the participants and highlighted the importance of communicable diseases in the context of global health security. WHO, its Member States and partners give the highest priority to containing the threat of emerging and re-emerging infectious diseases, together with efforts to eradicate diseases such as dracunculiasis and poliomyelitis and controlling major neglected tropical diseases. Professor Sir Roy Anderson was appointed as chairman, and Professor David W.T. Crompton as rapporteur.

### **Role and functions of the Strategic and Technical Advisory Group**

The Strategic and Technical Advisory Group (STAG) is the principal advisory group to the World Health Organization (WHO) concerning the control of neglected tropical diseases (NTDs). The group is charged with advising WHO and its Director-General on global public health policies and strategies, ranging from epidemiology to the delivery of health interventions and their linkages with other health and development interventions. The mandate of the STAG includes providing advice on (i) progress towards achieving the goals of the global plan to control NTDs, (ii) challenges to the global plan to control NTDs, (iii) intersectoral activities and initiatives related to NTD control, (iv) monitoring and evaluation of control activities and (v) research and development to support the control of NTDs.

The members of the STAG accepted this mandate and the other responsibilities set out in the STAG's Constitution, and recognized the need to be sensitive to any individual conflicts of interest that might tend to influence the formulation of independent advice concerning the control of NTDs.

### **Neglected tropical diseases**

NTDs consist of a heterogeneous assemblage of diseases (Annex 1) that have a major adverse impact on the health, well-being and socioeconomic development of many communities in developing countries, particularly in the world's low-income countries. WHO defines NTDs as those diseases affecting almost exclusively poor and powerless

people living in rural parts and urban slums of low-income countries. While the effect of NTDs on the health and human rights of individuals is well established and widely publicized, their effect on national economic growth and development should not be ignored, particularly if progress is to be made towards achieving the Millennium Development Goals.

NTDs exhibit marked differences in epidemiology, distribution, modes of transmission, and mortality and morbidity rates. Some NTDs affect millions of people, while others affect a few thousand, but in all cases the consequences are serious. For example, infections with soil-transmitted helminths cause chronic morbidity in millions of children annually, of whom relatively few die, while human African trypanosomes induce disease in about 60 000 people annually, almost all of whom will die if not treated. Other forms of NTDs are often classified as zoonoses because their persistence and transmission to humans depend on the human–animal interface. The concept of a disease as a zoonosis is somewhat artificial and ignores evolutionary events. The human–animal interface has emerged through time as our species developed in parallel and in interaction with many other species and their infectious agents which have and are also evolving.

The description of these infectious diseases as neglected reflects the lack of attention given to them until recently by the affluent regions of the world. With few exceptions, NTDs do not readily spread from country to country. In contrast, the diseases have not been neglected in countries where they are endemic, but scarcity of resources, the demands of other forms of health care and the need for stronger infrastructure have curtailed efforts to implement control programmes.

### **Information about neglected tropical diseases reviewed and discussed by the group**

The discussions on NTDs were based on papers made available to each member of the STAG either before or during the meeting (Annex 2) and through three presentations:

- 1 “WHO strategy for the control of neglected tropical diseases” by Dr Lorenzo Savioli, Director of the Department of Control of Neglected Tropical Diseases;
- 2 “Special Programme for Research and Training in Tropical Diseases (TDR)” by Dr Robert Ridley, Director of the Programme;

3 “Neglected zoonotic diseases” by Dr Francois-Xavier Meslin, Coordinator, Emerging Public Health Risks.

### **Advice from the group to the World Health Organization**

The advice to help facilitate the control of NTDs took the form of 14 action points and five priority research themes.

#### ***Action points***

The 14 action points agreed upon by the STAG were that it

1. accepts as its primary role the provision of objective advice to WHO based on critical review of the available evidence;
2. endorses and welcomes the enlightened vision of the WHO Department of Control of Neglected Tropical Diseases as it seeks with respect to Human Rights, to make a major contribution to the alleviation of poverty and the promotion of economic development based on (1) intervention packages by means of preventive chemotherapy and transmission control, (2) the development of innovative and intensified disease management, and (3) evidence-based advocacy for expansion of NTD control;
3. acknowledges the central contribution of the pharmaceutical industry to the control of NTDs and encourages WHO to give due and wider recognition to this fundamental and important commitment to human welfare;
4. believes that reduced disease burden and economic growth are intimately related as emphasized in the *Report of the Commission for Africa*;<sup>1</sup>
5. encourages WHO and its Member States to expose more fully the importance of NTDs to global health, poverty alleviation and economic development wherever appropriate, and in particular at the G8 meeting in 2008 in Japan, given the influence

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<sup>1</sup> See [Our Common Interest - Report of the Commission for Africa](#)", 11 March 2005 31, page 188

of this meeting on resource allocation, policy formulation and furthering the Human Rights agenda;

6. proposes that WHO should seek opportunities to engage in discussions with the pharmaceutical industry concerning NTD control, particularly regarding the possibility of expanded donations, and logistic and operational capabilities for delivering health care where NTD control is in progress;
7. stresses the importance of advocacy for NTDs by publicizing successes such as the increased effort towards the eradication of dracunculiasis and onchocerciasis, for other such programmes that have secured better health for millions of poor people and for the remaining important challenges including morbidity and disability control;
8. expresses concern that there is an already deficient and still declining expertise and training in vector control and encourages WHO and Governments to increase their efforts to establish or strengthen their capacities, given that so many NTDs are vector-borne and that for some NTDs vector control is the sole option;
9. encourages WHO to support increased, quantitative, health economics analysis given its importance in policy formulation and resource allocation for NTD control;
10. endorses the close linkage between successful interventions for NTD control and research in methodology, innovation in delivery, and accurate surveillance and evaluation, noting that emphasis on the importance of supporting operational research should be made to governments and funding agencies in addition to the need to support discoveries in biomedical research;
11. requests that WHO appoints at least two more experts to STAG to cover the high importance of health economics and zoonotic diseases as these relate to control of NTDs;

12. recommends that WHO establishes a working subgroup of STAG to devise procedures for monitoring the impact of packaged interventions for the control of NTDs;
13. encourages WHO to incorporate the control of NTDs into the health agendas of regional, subregional and national economic forums;
14. encourages the exploitation of the opportunity presented by integrated packages for NTD control to strengthen health care systems in poor countries of the world.

### ***Research themes***

In identifying these research topics, STAG seeks to assist WHO's effort to control NTDs and to further enhance collaboration and implementation of interventions between the Department of Control of NTDs and other relevant departments such as Social Determinants of Health and TDR.

STAG seeks to publish a peer-reviewed article describing the WHO NTD strategy and research priorities in the free access medical and scientific literature.

The five broad areas of research priority agreed upon by the STAG were:

- 1. Burden and economic impact of NTDs**

To include: a review of disability-adjusted life years (DALYs) and their appropriateness as a health impact measure for NTDs; work on better data acquisition for burden of disease and disability assessment; assessment of the psychological impact of NTDs; and gender disaggregation of DALY calculations.

- 2. Pharmacovigilance and surveillance**

To include: monitoring of drug efficacy, safety and resistance; assessment and monitoring of the impact and safety of combination treatments including

multiple drugs and vaccines; clinical studies of side-effects and pharmacokinetics plus dynamics in delivery of multiple therapies.

**3. Epidemiology and public health**

To include: distributional mapping of disease co-endemicity; trials of combination interventions; new diagnostic and surveillance tools (e.g. for food-borne trematodes and *Onchocerca* spp.); health systems for effective delivery; health-seeking behaviours.

**4. Health economics and comparative cost and cost-effectiveness**

To include: new methods for quantitative evaluation of health economics for NTDs; detailed cost-effectiveness studies in different country locations; the development of key indicators and data capture tools for evaluation of health economics.

**5. Interactions of NTDs with HIV/AIDS, malaria and tuberculosis**

To include: a focus on large-scale longitudinal studies for these interactions, with fine stratification for the many confounding variables, such as age, gender, nutritional status, pathogen burden and stage of disease.

This first meeting of the STAG was closed on behalf of WHO by Dr Lorenzo Savioli, who thanked the chairman, members and participants (Annex 3) for their expertise and commitment in assisting WHO in its efforts to control NTDs.

## **Annex 1:**

### **Neglected tropical diseases**

- One billion people are infected, with two billion at risk in tropical and subtropical countries/areas.
- 100% of low-income countries are affected simultaneously by more than five diseases.
- Those most affected are the poorest people, often living in remote rural areas, urban slums or in conflict zones.
- The diseases flourish under conditions linked to poverty – unsafe water, poor sanitation, substandard housing, and reservoirs for insects and other disease vectors.
- Children and women are disproportionately affected and may suffer lifelong consequences, including severe physical pain, irreversible disability and gross disfigurement; if the diseases are not treated, women and children may die.
- Social stigmatization and discrimination compound these consequences.
- Many of these diseases can be prevented, eliminated or even eradicated all at once with improved access to a package of safe and cost-effective tools.

The list of neglected tropical and zoonotic diseases is not exhaustive and has regional and national variations. Initially, WHO will focus on the following diseases: Buruli ulcer, Chagas disease, dracunculiasis, human African trypanosomiasis, leishmaniasis, leprosy, lymphatic filariasis, onchocerciasis, schistosomiasis, soil-transmitted helminthiasis and yaws as well as zoonotic diseases.

### **Selected neglected tropical diseases and zoonoses: definition and global burden**

#### **Blinding trachoma**

Trachoma is an infection of the eyes caused by the organism *Chlamydia trachomatis* that may result in blindness after repeated re-infections. It is passed on through – the discharge from an infected child's eyes – by the hands, on clothing, or by flies that land on the face of the infected individual. The world's leading cause of preventable blindness, trachoma occurs where people live in overcrowded conditions with limited access to water and health care.

Trachoma spreads easily from person to person and is frequently passed from child to child and from child to mother within the family. Infection usually first occurs in childhood, but people do not become blind until adulthood. The disease progresses over years as repeated infections cause scarring on the inside of the eyelid, earning it the name of the “quiet disease”. WHO estimates that six million people worldwide are blind due to trachoma, with more than 150 million in need of treatment.

### **Buruli ulcer**

Buruli ulcer is a severe bacterial skin disease caused by *Mycobacterium ulcerans*. The disease is poorly understood and the exact mode of transmission is unknown. Nonetheless, good progress has been made: two common anti-TB medicines (streptomycin and rifampicin) have been confirmed as effective treatment of the disease, and WHO aims to reach the affected populations for early detection and treatment.

Buruli ulcer has been reported in over 30 countries mainly with tropical and subtropical climates, but cases may also occur in some countries where the disease has not yet been recognized. It is difficult to establish the exact number of people affected due to variability in the clinical presentation, insufficient knowledge of the disease among health workers and geographical barriers to access to remote endemic areas.

Left untreated, the disease progresses to massive destruction of the skin and, in some cases, of bone, eyes and other tissues. Permanent disabilities occur in an estimated 25% of cases. Limb amputations may be needed to save a patient’s life. Even when skin lesions heal, scarring can permanently restrict the movement of limbs.

### **Chagas disease**

Chagas disease is a parasitic disease resulting from the bite of, and subsequent defecation with, faeces containing the infective stage of this protozoan parasite of the triatomine bug, or “kissing bug”, which resides in crevices in the mud walls and thatched roofs of poorly constructed houses, usually in rural areas and periurban slums throughout Latin America. Transfusion of infected blood is a second significant mode of transmission. Chronic infection, which usually begins in childhood, irreversibly damages the heart, oesophagus, colon and peripheral nervous system in later life. Patients with severe chronic disease

become progressively ill and ultimately die, usually from heart failure and often early in adult life. It is endemic in 21 countries, with 16–18 million people infected and 100 million at risk.

### **Cysticercosis**

Human cysticercosis is caused by the development of *Taenia solium* cysticerci in human tissues. Humans acquire the infection by ingestion of raw pork containing cysticercus. Frequency of the disease has decreased in developed countries owing to stricter meat inspection, improved hygiene and better sanitary facilities.

Symptoms include epileptiform attacks, headaches, learning difficulties and convulsions. The location that most often prompts a medical consultation is the central nervous system, followed by the eye and its surrounding tissues.

Treatment of cysticercosis is very difficult, with varying success. Prevention is based on strict meat inspection, health education, thorough cooking of pork and beef, sound hygiene and widespread sanitary installations.

### **Dengue and dengue haemorrhagic fever**

Dengue is a mosquito-borne viral infection that has become a major international public health concern in recent years. Dengue is found in tropical and subtropical regions around the world, predominantly in urban and semi-urban areas. A rapid rise in urban populations is bringing ever greater numbers of people into contact with the predominantly urban species *Aedes aegypti*, especially in areas that are favourable for mosquito breeding, e.g. where household water storage is common and where solid waste disposal services are inadequate. Some 2500 million people – two fifths of the world's population – are now at risk from dengue. WHO currently estimates there may be 50 million cases of dengue infection worldwide every year.

Dengue haemorrhagic fever is a potentially deadly complication. It is characterized by high fever, haemorrhagic phenomena – often with enlargement of the liver – and, in severe cases, circulatory failure. Today, dengue haemorrhagic fever affects most Asian countries and has become a leading cause of hospitalization and death among children in several of these countries. Dengue is also widespread in several parts of Latin America and the Caribbean.

### **Dracunculiasis**

Dracunculiasis (guinea-worm disease) is an eradicable disease caused by the parasitic worm *Dracunculus medinensis* or “guinea-worm”. This worm is the largest of the tissue parasites affecting humans. When a person drinks contaminated water from ponds or shallow open wells, the Cyclops intermediate host is dissolved by the gastric acid of the stomach and the larvae are released and migrate through the intestinal wall. After about one year of the infection, the female worm, with its uterus filled with larvae, emerges usually from the feet repeating the life cycle.

No medicines are currently available to prevent or heal this parasitic disease – the only disease exclusively associated with unsafe drinking-water.

During 2005, the total number of dracunculiasis cases reported to WHO worldwide was 10 674. An effective preventive measure being used to eliminate the disease is to filter suspected contaminated water through a simple gauze filter to eliminate swallowing the Cyclops.

### **Echinococcosis**

Cystic echinococcosis is principally maintained in the dog–sheep–dog cycle. The infection is transmitted to dogs when they are fed infected viscera of sheep during the home-slaughter of sheep. Direct contact with dogs is an important mode of transmission to humans, as is consumption of vegetables and water contaminated with infected dog faeces. Humans are accidental intermediate hosts and are not able to transmit the disease.

There are areas of high endemicity in southern South America, the Mediterranean coast, the southern part of the former Soviet Union, the Middle East, south-western Asia, northern Africa, Australia, Kenya, New Zealand and Uganda.

### **Human African trypanosomiasis**

Human African trypanosomiasis, or sleeping sickness, is one of the most complex of the endemic tropical diseases. Spread by the bite of the tsetse fly, the disease flourishes in impoverished rural parts of Africa. In 2006, WHO estimated that the disease affects some 70 000 people.

Sleeping sickness is one of the few diseases where effective treatment depends on active screening for the early detection of cases. Symptoms in the initial phase of the illness, when treatment has the greatest chance of success, are often mild or nonspecific. However, patients frequently present for treatment when the disease is already far advanced, more complex treatment is needed and the chances of success are jeopardized. Untreated, sleeping sickness is invariably fatal. Death follows prolonged agony.

### **Japanese encephalitis**

Japanese encephalitis is a mosquito-borne arbovirus infection, with seasonal distribution. The disease, which is transmitted by *Culex* mosquitoes, is endemic in most parts of Asia with temperate and subtropical or tropical climate, including Cambodia, China, India, Indonesia, Japan, Lao People's Democratic Republic, Malaysia, Nepal, Philippines, Republic of Korea, Russian Federation, Sri Lanka, Thailand, Torres Strait Islands and Viet Nam.

The disease affects mostly infants and children, but all age groups can develop the disease. Most infections result in mild symptoms or no symptoms at all. On average, 1 in 300 infections results in symptomatic illness, which is characterized by a flu-like illness with sudden onset of fever, chills, headache, tiredness, nausea and vomiting.

The illness can progress to encephalitis (infection of the brain) and can be fatal in 30% of these cases.

### **Leishmaniases**

Leishmaniasis, a parasitic protozoal disease transmitted by the bite of the sand fly, threatens 350 million men, women and children in 88 countries around the world.

This disease has a wide range of clinical symptoms. Visceral leishmaniasis, which attacks the internal organs, is the most severe form. Left untreated, it is usually fatal within two years.

Furthermore, a percentage of cases can evolve to skin dissemination of parasites. The cutaneous form is the most common. It usually causes ulcers on the face, arms and legs. Although the ulcers heal spontaneously, they cause serious disability and leave severe and permanently disfiguring scars. Far more devastating is the mucocutaneous form, which invades the mucous membranes of the upper respiratory tract, causing gross mutilation as it destroys the soft tissues of the nose, mouth and throat. Diffuse cutaneous leishmaniasis produces chronic skin lesions that never heal spontaneously. The sixth form, recidivans

cutaneous leishmaniasis, is a relapsing form that appears after treatment. WHO estimates that 12 million people are currently infected, and around 1.5 million to 2 million new infections occur each year.

### **Leprosy**

Leprosy is a chronic disease caused by the bacillus *Mycobacterium leprae*. *M. leprae* multiplies very slowly and the incubation period of the disease is about five years. Symptoms can take as long as 20 years to appear.

Leprosy mainly affects the skin and nerves; if untreated, there can be progressive and permanent damage to the skin, nerves, limbs and eyes. Throughout history, the afflicted have often been ostracized by their communities and families. However, leprosy is not highly infectious and is readily curable. The availability of a highly effective cure – multidrug therapy – led to the vision of a world without leprosy. Today, 116 out of 122 endemic countries have eliminated leprosy as a public health problem. The global registered prevalence of leprosy at the beginning of 2006 was 219 826 cases.

### **Lymphatic filariasis**

Lymphatic filariasis, or elephantiasis, remains silent for a long time after infection that is mostly acquired in childhood. The disease is transmitted by mosquitoes that bite infected humans. The thread-like, parasitic filarial worms *Wuchereria bancrofti* and *Brugia malayi* that cause lymphatic filariasis live almost exclusively in humans. These worms lodge in the lymphatic system, the network of nodes and vessels that maintain the delicate fluid balance between the tissues and blood and are an essential component of the body's immune defence system. The worst symptoms of the chronic disease generally appear in adults, and in men more often than in women: damage to the lymphatic system, kidneys, arms, legs or (especially in men) genitals causes significant pain, lost productivity on a huge scale and discrimination.

Over 120 million people are currently infected and around 1.3 billion people in more than 80 countries are at risk of infection.

### **Onchocerciasis**

Onchocerciasis, or river blindness, is a parasitic disease caused by a filarial worm that is transmitted to humans through the bites of black flies that breed in fast-flowing rivers. The disease causes severe visual impairment, including permanent blindness, and can shorten the life expectancy of its victims by up to 15 years. Other devastating effects of onchocerciasis are skin nodules and onchocercal skin disease characterized by skin lesions (severe itching, dermatitis, depigmentation, etc.). Severe itching alone is estimated to account for 60% of the disease burden.

More than 100 million people are at risk of infection and some 37 million people are estimated to be infected. Over 99% of those affected live in Africa.

### **Rabies**

Rabies is a zoonotic viral disease that infects domestic and wild animals. It is transmitted to other animals and humans through close contact with saliva from infected animals (i.e. bites, scratches, licks on broken skin and mucous membranes). Once symptoms of the disease develop, rabies is fatal in both animals and humans.

The first symptoms of rabies are usually nonspecific and suggest involvement of the respiratory, gastrointestinal and/or central nervous systems. In the acute stage, signs of hyperactivity (furious rabies) or paralysis (dumb rabies) predominate. In both furious and dumb rabies, paralysis eventually progresses to complete paralysis followed by coma and death in all cases, usually due to respiratory failure.

Without intensive care, death occurs during the first seven days of illness.

### **Schistosomiasis**

Schistosomiasis, one form of which is also known as bilharziasis, is a parasitic disease that leads to chronic ill-health. People infected with schistosomiasis expel parasite eggs in their faeces or urine. In villages or communities where there is no proper latrine system or sanitation, freshwater sources around the village or community can easily become contaminated with faeces or urine containing the eggs. On contact with water, the eggs hatch and release larvae called miracidia. If the miracidia find the right type of snail, they use it to multiply in several cycles, eventually producing thousands of new parasites, called cercariae, which the snail then releases into the surrounding water.

Humans become infected when they come into contact with contaminated water. A child who has suffered persistent and heavy infections is likely to have chronic, irreversible diseases such as liver fibrosis, cancer of the bladder or kidney failure, later in life.

An estimated 70 million people with urinary schistosomiasis in Africa currently suffer from bloody urine, indicating damage of the bladder and urinary tract. Forms of schistosomiasis also occur in parts of South-East Asia and Latin America and the Caribbean.

### **Soil-transmitted helminthiasis**

“Helminth” is the technical word for a worm. Soil-transmitted helminths are also known in many places simply as common intestinal worms. Approximately 1.6 billion – one sixth of the world’s population – is at risk of infection.

A person infected with soil-transmitted helminths has parasite eggs in his or her faeces. In areas where there is no latrine system, the soil (and water) around the village or community becomes contaminated with faeces containing worm eggs. The symptoms of soil-transmitted helminth infections, which are nonspecific and become evident only when the infection is particularly severe, include nausea, tiredness, abdominal pain and loss of appetite. Worm infections aggravate malnutrition and amplify rates of anaemia. They impede children’s physical growth and cognitive development, contributing significantly to school absenteeism.

### **Yaws**

Yaws is a contagious, nonvenereal, treponemal infection in humans that presents mainly in children younger than 15 years. Peak incidence occurs in children aged 6–10 years. It occurs primarily in warm, humid, tropical areas among poor rural populations where conditions of overcrowding, poor sanitation and inadequate water supply prevail. The major route of infection is through direct person-to-person contact. In the majority of patients, yaws remains limited to the skin, but early bone and joint involvement can occur. Although yaws lesions disappear spontaneously, secondary bacterial infections and scarring are common complications.

After 5–10 years, 10% of untreated patients develop destructive lesions involving bone, cartilage, skin and soft tissue, similar to those seen in tertiary syphilis. In contrast to venereal

syphilis, cardiovascular and neurological abnormalities almost never occur in patients with yaws.

Yaws is a significant public health problem in two countries of South-East Asia, and some countries in the African and Western Pacific regions. In South-East Asia, about 5000 cases are reported annually; 4000 in Indonesia and 1000 in Timor-Leste. India has recently eliminated the disease.

## Annex 2: List of materials circulated to members

- *Strategic and Technical Advisory Group on Neglected Tropical Diseases*
- *WHO working paper and list of issues to be addressed*
- *Global plan to combat neglected tropical diseases 2008–2015 (fourth draft)*
- *Annual report 2006 on neglected tropical diseases (preliminary draft)*
- *Neglected tropical diseases: hidden successes, emerging opportunities*
- *Preventive chemotherapy in human helminthiasis: coordinated use of anthelmintic drugs in control interventions. A manual for health professional and programme managers*
- *Global strategic framework for integrated vector management*
- *Strategic and technical meeting on intensified control of neglected tropical diseases, Berlin, 18–20 April 2005*
- *Intensified control of neglected diseases. Report of an International Workshop, Berlin, 10–12 December 2003*

Note: These documents are available at [http://www.who.int/neglected\\_diseases/](http://www.who.int/neglected_diseases/)

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