

Neglected tropical diseases



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What are the neglected tropical diseases?

Seventeen neglected tropical diseases (NTDs) have been identified by the World Health Organization (WHO). It is estimated that over 1 billion people are infected with NTDs, with a further 1 billion at risk. The majority of NTDs occur in the tropics and sub-tropics and have particular characteristics in common:

- They afflict the poorest people – those without access to the safe water, sanitation, and basic health services required in order to protect themselves against infection by bacteria, viruses and other pathogens. High-income groups are rarely affected.
- Many are chronic, slowly developing conditions that become progressively worse if undetected and untreated. The damage they cause can be irreversible.
- They can cause severe pain and life-long disabilities, with long-term consequences for the person and also for family members who have to care for the person.
- People with NTDs are often stigmatised and excluded from society, and this can affect their mental health.

The individual diseases are very different, and one person can be affected by more than one disease at the same time.



Kate Holt/Sightsavers

Community distribution
of ivermectin for
onchocerciasis. NIGERIA

The infectious agents responsible include:

- viruses (rabies and dengue)
- bacteria (leprosy, yaws, trachoma and Buruli ulcer)
- protozoa (leishmaniasis and trypanosomiasis)
- helminth parasites (schistosomiasis, lymphatic filariasis, onchocerciasis, intestinal worms and Guinea worm).

Transmission is equally diverse and can take place via:

- flies, fomites (e.g. skin cells, hair, clothing or bedding) and fingers (trachoma)

- mosquitoes (dengue fever and filariasis)
- tsetse flies (sleeping sickness)
- sandflies (leishmaniasis)
- blackflies (onchocerciasis)
- snails, which release infective larvae into water to penetrate human skin (e.g. schistosomiasis)
- the faeco-oral route (e.g. soil-transmitted helminths – see page 29) or via food products.

NTDs can cause blindness (onchocerciasis and trachoma), deformity and disablement, disfigurement, cancers, and neurological problems.

Continues overleaf ➤

ABOUT THIS ISSUE



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In 1988, Merck in the USA made Mectizan available at no cost to communities with onchocerciasis infection. The commitment was 'as much as is needed for as long as it is needed.'

This game-changing donation heralded the development of a new global partnership in health between the pharmaceutical industry, UN agencies,

national ministries of health, non-governmental organisations and communities at risk – sectors of society which normally do not work together. Although they have different structures, driving forces, and skills, they agreed to break down the barriers that usually make them work in separate silos and to come together with a common vision to control and eliminate the specific diseases affecting neglected people. Two of these diseases – onchocerciasis and trachoma – cause blindness. Thanks to these ongoing

donations, the challenge with neglected tropical diseases today is not so much to discover a treatment but rather to reach the very remote communities with an integrated, effective and sustainable programme of disease control.

This edition of the *Journal* aims to inform our readers about the neglected tropical diseases, the communities affected, and the available control measures. Emphasis is placed on integration and learning from each other to make the programmes more effective.

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The biological diversity of NTDs means that the control or elimination strategies also are very diverse.

Several NTDs can be controlled by drug treatment (preventive chemotherapy), on a country or community scale, via mass drug administration programmes. Other NTDs require different approaches and strategies for control or elimination, including specialised drugs and/or vector control (limiting or eradicating insects – e.g. flies and bugs – that transmit the pathogens).

Despite the diversity of the strategies, however, there are good opportunities for comprehensive NTD elimination and control programmes.

The social and economic impact of NTDs

NTDs are a result of poverty; they also contribute to further poverty in those people affected. Indeed, the prevalence of some NTDs has been suggested as an indicator of poverty.^{1,2} They also have a wide social and economic impact:

- the loss of ability to undertake traditional farming practices, critical for survival in rural environments
- the loss of ability to play an economic and social role within the family and community
- the cost of inappropriate treatment (for example, traditional healers), which enhances the cycle of poor health and poverty
- the loss of educational opportunities, as children must act as caregivers for their

parents, creating a generation of people with little or no education

- poor mental health of the patient and the caregiver, particularly chronic depression.

The impact of NTDs on the unpaid work provided by women in the community is more difficult to measure. When women are ill, they are less able to do work such as growing vegetables, fetching water and fuel, providing care for older people and children, and ensuring that family members wash their hands or wear shoes – which reduces the transmission of NTDs. Women tend to have poorer access to health care than men and are also disproportionately affected by some NTDs, such as trachoma.³

Why are NTDs receiving increased international recognition?

Over the last decade, NTDs have received increased recognition. This was made possible thanks to the establishment of NTDs as a 'brand' in global health.

It was difficult to focus the world's attention on 17 very different diseases requiring a range of different interventions. By recognising what these diseases had in common, and grouping them together under the NTD 'brand', however, it became possible to construct compelling arguments for action at the international level. These arguments were supported by good evidence: that addressing NTDs is cost effective in terms of economic



Volume 26 | Issue 82

Supporting
VISION 2020:
The Right to Sight



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eye care workers in low- and middle-income countries. Send credit card details or an international cheque/banker's order payable to London School of Hygiene & Tropical Medicine to the address below.

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Community Eye Health Journal,
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Medicine, Keppel Street, London
WC1E 7HT, UK.

Tel +44 207 612 7964/72

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Centre for Neglected Tropical Diseases

Treatment is brought to every home in the village. ZANZIBAR

rates of return on investment of health dollars, leading to 'more health, for more people, for fewer dollars.'⁴ Further, the relationship between NTDs and social, equity/equality and development issues means they fall within the mandate of development agencies, therefore meriting both technical and financial support.

What is being done to control NTDs?

The drugs needed to treat NTDs are now included on the WHO 'Essential Medicines' list, and pharmaceutical companies are making them freely available to the populations in need through donation programmes.

These programmes, together with increased country commitment to the control of NTDs and novel approaches to drug distribution (e.g. through community-directed interventions or school health programmes) have made it possible to address some NTDs (trachoma, onchocerciasis, lymphatic filariasis, soil-transmitted helminths, and schistosomiasis) on a massive scale, in what have become known as mass drug administration (MDA) programmes.

Community-directed treatment has been developed and promoted as a recommended way of providing mass

drug administration. Communities take responsibility for the collection, delivery, and reporting of drug use. This is an effective approach: annual treatment records for onchocerciasis suggest that some 70% of the ivermectin approved for use is administered to those who need it within a 12-month period.

Mass drug administration programmes bring multiple benefits, including:

- direct impact on individual health, even beyond the target infection
- improved community engagement in health programmes
- better access to health care for populations that had little or no access
- an improved drug supply chain
- enhanced data management, monitoring, evaluation, surveillance and reporting systems.

What more needs to be done?

The majority of countries in Africa have completed their NTD master plans. Resources must be allocated to these plans and countries need to commit to the World Health Assembly (WHA) Resolution⁵ and the WHO Road Map.⁶

The second WHO Report on NTDs, 'Sustaining the Momentum'⁷, was published recently and identified progress since the first report.⁸ It also identifies the challenges in the way of achieving the disease-specific goals.

There is a need for rapid up-scaling in some of the most populous countries to reach the WHO targets and timelines for control/elimination. To address this, NTD partners need to:

- engage in advocacy in their country
- complete mapping
- enhance human resource capacity in order to deliver integrated treatments within the health system
- address the backlog of surgery for some diseases (in particular, trachoma and lymphatic filariasis)

Table 1. The 17 neglected tropical diseases, as defined by the World Health Organization

Buruli ulcer (<i>Mycobacterium ulcerans</i> infection)
Chagas disease
Dengue/severe dengue
Dracunculiasis (Guinea-worm disease)
Food-borne trematodiasis and fascioliasis (liver flukes)
Human African trypanosomiasis (sleeping sickness)
Human echinococcosis (hydatid disease)
Leishmaniasis
Leprosy
Lymphatic filariasis
Onchocerciasis (river blindness)
Rabies
Schistosomiasis (bilharzia)
Soil-transmitted helminthiasis
Taeniasis/cysticercosis (tapeworms)
Trachoma
Yaws (endemic treponematoses)

- implement a new strategy in areas where *Loa loa* (tropical eye worm) is co-endemic with lymphatic filariasis. This is due to the problems of severe reactions to ivermectin when people have high parasite loads of *Loa loa*.

Globally, the investment required for the delivery of donated drugs is estimated at around US \$0.50 per person treated, per year. Included in this 'unit cost' is the cost of training, social mobilisation, evaluation and monitoring, and surveillance, all of which are needed for mass drug administration programmes to be effective. The unit cost is estimated to be even lower in some settings: around US \$0.10–0.20 per person treated, per year. Even in the poorest countries, this represents just a small fraction of the national per capita health expenditure.

Conclusion

Programmes to eliminate and control NTDs address issues of equity (equal access to health care) and are interventions that directly benefit the poor. The

Continues overleaf ➤

Action on neglected tropical diseases at the global level

- On 27th May 2013, the WHA passed a resolution on all 17 neglected tropical diseases (Resolution WHA 66.20).⁵
- NTDs have been included in the post-2015 Development Agenda.⁹ Goal 4e states: 'Reduce the burden of disease from HIV/AIDS, tuberculosis, malaria, neglected tropical diseases, and priority-non communicable diseases.'
- In early 2012, the London Declaration¹⁰ was endorsed by 77 companies and organisations. The declaration included an increased commitment to drug donations and product development research to support the World Health Organization (WHO) Road Map⁵ towards the specific 2012–2020 NTD targets.
- USAID and the UK Department for International Development have increased their support for the elimination of NTDs, and the Bill & Melinda Gates Foundation has committed significant research funds to address operational and product-oriented research for NTDs.

drug treatments are effective and broadly safe when correct policies are followed (see page 26).

Mass drug administration programmes that reduce morbidity, mortality and transmission – leading to elimination of some of the world's most distressing diseases – should be regarded as akin to global immunisation when viewed from a strategic perspective. They have proved that it is possible to deliver free drugs to the poorest in need at unit costs that even some of the poorest countries can afford, and have already afforded. We must call for this successful intervention to be made available to everyone who needs treatment. If this relatively easy type of intervention – free drugs, no need for a cold chain – cannot be replicated and scaled up to reach everyone who needs treatment, worldwide, there is little hope that we can make a significant impact in other priority areas, such as maternal and child health, or vaccinations.

The NTD community has been successful in achieving a paradigm shift in the global health community's thinking about these diseases, as exemplified in a WHA Resolution and their inclusion in the a post-2015 Health Goal (see panel, page 23). What were hitherto unpronounceable conditions of poor people, and which did not concern high-income countries, are now high on the global health agenda. Consciousness has been raised but there remain many challenges, both technical and operational.

A higher level of commitment is needed from the endemic countries, additional donors, non-governmental organisations, and charities. NTD partnerships recognise that they must face the following challenges: **communicating** the need for **country commitment** to enhance geographic and therapeutic **coverage** and improve **compliance**, and achieving this by prioritising **capacity strengthening** from the **centre** to the **communities**.

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Hannah Faal

Chairperson: Africa Vision Research Institute, Durban, South Africa.

The Gambia. People conducting a population-based survey randomly selected the hamlet of Tunku. The survey team waded across flooded paddy fields, constantly asking for directions. Tunku turned out to be a cluster of five mud huts perched on a hill on the bank of the River Gambia. The team found two families and one blind old woman there. The villagers could only reach their homes from the river using dugout canoes, and they grew their crops in fields that flooded. Why would anyone choose to live here, in this 'end of the road' place?

Nigeria. Ibadan is an ancient city that grew around its traditional palace. Out of the city's overcrowded and labyrinthine streets, weeping mothers streamed daily to the tertiary teaching hospital less than half an hour away with children dying or dead from diseases such as malaria, diarrhoea, or marasmus. In the hospital, they saw clean wards with crisp white bed sheets — an unimaginable and unattainable luxury for them in their homes. Meanwhile, medical students ventured in the opposite direction, through the same labyrinthine depths and into homes in which gutters with filthy waste water ran through the middle of rooms and the latrine was just outside the window. Their purpose? A paediatric posting, but the challenges they found in these urban slums demanded a public health approach. Their traditional doctor's training was powerless in the face of such challenges.

NEGLECTED COMMUNITIES

Neglected communities

Nairobi, Kenya. Known as a cantankerous old woman, she lived alone in a large house in the expensive part of town. The house and garden had seen better days. Someone came in to drop her daily meal and rushed out because of the strong smell of decay and the madness of the old woman. When she was found unable to walk because of a fall in her kitchen and forced to go to the clinic, it was discovered that she had blinding cataracts; her poor vision at least one of the causes of her apparent self-neglect. She epitomised neglect by self and by others – even in the absence of poverty.

Like the people in Tunku and in the slums around Ibadan, poor and/or remote

communities around the world – whether rural or urban – are often neglected, whether in Africa, the Amazon, Australia or the Indian sub-continent. However, neglected people can even be found in affluent communities.

If we want to address neglected tropical diseases

(NTDs), we have to focus on the communities affected. As David Molineux writes on pages 21–24, NTDs affect people who are neglected in a variety of ways: through poverty and lack of access to basic water and sanitation, health services, and education ... In fact, just about every facet of development.

How can eye care programmes respond to the challenge of reaching these neglected people? Here are some examples of different strategies.

Sri Lanka: into every home

Midwives, who function as family health workers, form the backbone of health service delivery in Sri Lanka. In 2000, there were over 5,000 midwives in the country, each responsible for between 3,000 and 4,000 people. This network should – in theory – reach the entire population of Sri Lanka. In rural Sri Lanka, it was noted at a Sightsavers review of primary eye care in 2010, that the midwives are welcomed into people's homes and know every household and family member intimately: the child whose Road to Health chart is kept by his literate mother (Sri Lanka has a 98% literacy rate), the grandfather with hypertension, and the grandmother reluctant to wear her glasses. One even helped a father who was determined to

What kinds of neglected communities are out there?

- Those at the 'end of the road' in inaccessible areas
- Migrant communities
- Those in slums: pockets of poverty in urban areas
- Post-disaster communities
- Communities in areas of conflict or in refugee camps
- Communities affected by environmental degradation from mining, climate change or bad development projects.



Genemo Abdela, health professional, is one of a team surveying almost 600,000 people in Ethiopia for the neglected tropical disease trachoma. ETHIOPIA

harvest rain water, dig a well, and build a latrine. By being so close to their local community, these health service workers are able to provide the right support, to the right person, at the right time.

Onchocerciasis in Africa

Onchocerciasis occurs among rural communities who live beside the fast-flowing rivers in which the black fly breeds. This fly is the 'vector' for transmission of onchocerciasis: the pathogen which causes the disease enters the bloodstream of people when they are bitten by the black fly.

Despite a major, decades-long programme of aerial spraying of the breeding sites, supplemented by treatment with the drug ivermectin, prevalence was still found to be high in some remote communities such as those in the highlands of Togo. A Special Intervention Zone was set up in Togo and in other countries with pockets of high prevalence in West Africa, and control measures were increased to ensure that people living in these remote areas were being protected.

Since its launch in 1995, the African Programme for Onchocerciasis Control (APOC) has developed community-directed strategies designed to ensure that even the most neglected communities could be reached. APOC defined the critical factors as being:

- commitment by everyone involved, from national to community level
- health system thinking: strengthening the health systems where they interact with the communities – on the 'front

line' of health care delivery

- paying attention to broader issues: gender and equity, health workers' roles, and community development and awareness
- encouraging the community in its role to recruit and support the workers
- engaging and empowering the communities in the partnership.

Adoption of these strategies by governments has led to successful control of onchocerciasis in Africa, so that in many areas there is the real possibility of elimination of the disease. In addition, these strategies have formed the basis for control of other neglected tropical diseases, like trachoma, and have been adapted to address other health and development programmes meeting the needs of some of the poorest and most neglected people.

Ghana: reaching remote island communities

In the 1950s, the leader of Ghana, Kwame Nkrumah, had anticipated his country's electricity needs and built a dam across the Volta river. As the surrounding countryside became flooded, hilltops became islands. Yet communities clung to these islands, and illiterate mothers kept their children's Road to Health charts beautifully wrapped in plastic, most of the cells not filled as the immunisation dates were missed.

In response, the health administration, with World Health Organization (WHO) support, focused their attention on the Volta region with the 'Reaching Every

District' (RED) approach. Selected districts were provided with funds and technical assistance to develop and implement micro-plans that covered outreach services, supervision and monitoring, social mobilisation, quarterly review meetings and other community activities in each of these remote communities. In addition, some districts received motorbikes and outboard motor boats to help them reach every island community and provide basic health services, including immunisation, vitamin A supplementation, de-worming medicines, and disease surveillance.

Where to now?

At the global level, policies emphasise the need to reach the poorest. Examples include Millennium Development Goal 1: the reduction of poverty and hunger, and the UN Human Development Index, which measures health, education and living standards. The WHO has addressed neglect of populations and communities by focusing on social determinants of health, equality issues, universal coverage, a human rights approach to health and a return to the primary health care philosophy. Advocacy has achieved a global determination to eliminate neglected diseases.

What can an eye care worker do?

The first step towards bringing better health and eye health to neglected communities, is for eye care workers to familiarise themselves with national strategies for reaching neglected communities. The second step is to create a map of the area covered by the district eye health programme (using criteria for neglect which have been defined by the health services). This will help to identify hard-to-reach or particularly disadvantaged communities that must be prioritised.

Eye health workers should look beyond 'just the eyes', and aim to be part of a campaign to take health into every home throughout the year. The trainers of eye health workers should ensure that they teach eye health workers about neglect in all its facets, its causes and its solutions, and the need to engage with other agencies working in health.

Further reading

Reaching every district (RED) manual
www.who.int/immunization_delivery/systems_policy/red/en/

Report of the external mid-term evaluation of APOC
www.who.int/entity/apoc/MidtermEvaluation_29Oct2010_final_printed.pdf

Closing the gap in a generation: health equity through action on the social determinants of health
www.who.int/social_determinants/final_report/



TREATMENT

Treating neglected tropical diseases



Adrian Hopkins

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The name neglected tropical diseases (NTDs) covers a range of diseases that cause disability, early death, and slowed physical and mental development. The first two in entries Table 1 are diseases that cause blindness. These diseases of neglected and impoverished peoples maintain a cycle of poverty and delayed development of the populations affected. The diseases themselves have been neglected in the push to control malaria, TB and AIDS.

The NTDs fall into two main groups. The first group, which we will deal with here, are those for which we have tools (easy community diagnosis or mapping, as well as the drugs or medicines). These NTDs can be treated – where safe to do so – in large populations of patients using a mass drug administration (MDA) strategy. Dosages are standardised, and a dose pole can be used to measure the height of a person in order to calculate the dose required.

The second group of diseases, which we will not discuss here, require either more difficult or costly diagnosis and the

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Lymphatic filariasis patients learn about the benefits of foot washing. SRI LANKA

people affected often need individualised treatment.

Treatment with drugs is important. Repeated annual or semi-annual drug distribution can lower the prevalence of a disease and, in some settings, eliminate transmission. However, in order to maintain these gains, more intensive

Table 1. Current treatment guidelines for the five neglected tropical diseases for which mass drug administration is possible

Disease	Drugs and Dosages	Threshold for implementation	Frequency of Intervention
Trachoma	Azithromycin 20 mg/kg, with a maximum dose of 1 g in adults. Use a dose pole to determine dose. Offer tetracycline eye ointment for children <6 months	• ≥10% to <30% TF (follicular trachoma) in of children aged 1–9 years: Treatment of total population in district for at least 3 years • >30% TF in children aged 1–9 years: treatment of total population for a minimum of 5 years • TF of 5–9% in children 1–9 yrs: targeted treatment based on sub-districts • TF <5%: S, F, E components only	Annual. Must be part of an integrated SAFE strategy (Surgery, Antibiotics, Facial cleanliness, Environmental improvement)
Onchocerciasis	Ivermectin 150 µg/Kg using dose pole for everyone >5 years (or >90 cm), except the chronically ill and pregnant and lactating women during the first week after delivery	For control: nodule prevalence ≥20% or skin microfilaria ≥40% For elimination: under discussion. APOC is using nodule prevalence ≥5%	Annual or twice yearly. (Exceptionally quarterly)
Lymphatic filariasis	Albendazole 400 mg for children aged >2 years plus diethylcarbamazine (DEC) 6 mg/kg in countries where onchocerciasis is not co-endemic, or ivermectin 150 µg/Kg in countries where onchocerciasis is endemic	Prevalence of ≥1%	Annual. Treatment must be combined with limb care of patients with elephantiasis or hydrocoele surgery
Soil-transmitted helminths (STH) (Ascaris, hookworms and Trichuris)	Albendazole 400 mg for children above 2 years, or mebendazole 500 mg	Prevalence ≥50%: treat school-aged children, and adults at high risk, twice yearly Prevalence >20% to <50%: treat school-aged children once per year. Prevalence <20%: individualised treatment. Pre-school children and women of child-bearing age should also be treated (as part of maternal and child health programmes)	Annual or twice yearly depending on prevalence. Water and sanitation strategies must be implemented
Schistosomiasis	Praziquantel 40 mg/kg (using dose pole) for children over 4 years (or 94 cms)	Prevalence ≥50%: treat all school-aged children. Adults at high risk may also be treated Prevalence >10% to <50%: treat children once every two years Prevalence <10%: individualised treatment	Annual treatment Treatment holidays can be given if prevalence drops. Water and sanitation strategies must be implemented

Adapted from: 'Preventive Chemotherapy in Human Helminthiasis.' This book should be consulted before commencing any MDA, however, the situation is continually changing as new research leads to new strategies.



Why water, sanitation and hygiene matter

efforts need to be made to provide safe water, sanitation, and hygiene. Specific measures are also required in trachoma and lymphatic filariasis (LF) to address the symptoms and consequences of these diseases, e.g. trichiasis surgery to correct in-turned eyelashes and prevent corneal scarring in people affected by trachoma and hydrocoele surgery for male genital deformity due to LF. The existence of an MDA programme is not a reason to ignore these other measures.

Many of the drugs used in MDA can be given together, at one time, so making distribution much more efficient. In Africa, ivermectin should be given with albendazole to eliminate LF. Both these drugs have an effect on soil-transmitted helminths (STHs), and ivermectin also kills ectoparasites such as scabies. Where populations are treated for LF, onchocerciasis and STHs will be treated at the same time. Praziquantel can also be given with ivermectin and albendazole. At the present time, research is ongoing into co-administration of azithromycin with ivermectin and albendazole, but for the moment there should be an interval of 2 weeks between the administration of azithromycin and the other drugs.

Precautions

Drugs used in MDA have certain adverse effects and there are several precautions to be taken before using them. Where there is a high worm load in onchocerciasis, there will be symptoms of pain, fever, itching and swelling after treatment, depending on the number of parasites present. These symptoms last for up to 2 days and need symptomatic treatment. Second and subsequent rounds of treatments have far fewer side effects and after three annual treatments there are usually no further adverse effects.

In forested areas of Africa where the parasite *Loa loa* (tropical eye worm) is present, ivermectin should only be given following strict guidelines, otherwise the effects can be severe and sometimes life threatening. Praziquantel should not be given on an empty stomach and will provoke nausea and vomiting in some children, particularly if they have not eaten. Azithromycin also can cause some minor stomach problems. Apart from the *Loa loa* situation, the adverse effects are minor and are not contra-indications to treatment; however, in people who suffer with many different parasites, drugs should not all be given together at the first administration.

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Water, sanitation and hygiene (WASH) are crucial but often underplayed parts of the prevention and control of a number of neglected tropical diseases (NTDs).

Access to safe water and adequate sanitation, together with good hygiene practices, can reduce the transmission of some NTDs, for example trachoma and intestinal worms (page 29). Trachoma is transmitted by flies, fomites (e.g. skin, hair, clothing, or bedding) and direct contact. Preventing transmission of trachoma can be achieved through access to clean water, appropriate hygiene practices that promote face washing, and access to proper sanitation for the disposal of human waste. Intestinal worms, which affect nearly 900 million people worldwide, is most prevalent in communities where people have inadequate access to toilets and/or hand washing facilities. Worms are transmitted through faecal-oral contact or enter through the skin of the feet in areas of open defecation. Access to safe water and adequate sanitation will help communities affected by both trachoma and soil-transmitted helminths (STH) to escape from the perpetual cycle of infection and reinfection.

Some global¹ and disease specific² strategies have integrated WASH interventions into their programming guidelines. In the case of trachoma, for

example, the inclusion of the 'F' (face washing) and 'E' (environmental improvement) in the SAFE strategy formally acknowledges the strategic importance of incorporating WASH interventions for disease elimination.

Some practical opportunities for integration

The acknowledgment of the importance of WASH for comprehensive NTD control has not always translated into effective incorporation of WASH interventions in NTD control programmes. Reasons for insufficient integration include the lack of awareness and information sharing between the WASH and NTD sectors, and a short-term view of disease control which fails to recognise, and invest in, the necessary long-term comprehensive activities required for sustainable WASH implementation.

People involved in WASH and NTD programmes should work closely together, in a coordinated manner. This might involve forming local and global partnerships, sharing information and research about disease impact, combining efforts when advocating for resources and political commitment to action, and planning sustainable programmes that meet goals for both the elimination of NTDs and the provision of adequate water, sanitation, and hygiene.

Unless WASH issues are adequately addressed, neglected tropical diseases will not be eliminated in the long term. Control may be achieved by the year 2020, but to prevent continued transmission and re-infection, sustainable WASH interventions are a necessity.



Adapted from Savage G, Velleman Y, Wicken J, NTD NGO Network. *WASH: The silent weapon against NTDs: working together to achieve prevention, control and elimination*. Australia: WaterAid Australia; 2012.

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Access to water can help to combat NTDs.



Better sanitation, with communities taking the lead



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Most traditional sanitation programmes provide some form of subsidy to individual families to reduce the cost of building a toilet. This approach is based on the assumption that both the construction and use of toilets depend on private decisions and on hygiene behaviour at the household level. However, this approach normally results in small, step-by-step changes in sanitation coverage, with further improvements becoming steadily more difficult once early adopters and households with higher incomes have installed sanitation facilities.

Few large-scale sanitation programmes of this type have been successful. It may be that households who build toilets under such heavily-subsidised programmes feel less ownership for their facilities and are therefore less inclined to make any lasting improvements to their hygiene behaviour.

Community-led total sanitation: a new approach

Over the last 15 years, non-governmental organisations (NGOs) in Bangladesh have pioneered a new approach to sanitation development known as community-led total sanitation (CLTS). This approach has also been replicated in a number of other countries in Asia and Africa. The key difference between previous approaches and CLTS was demand creation within communities.

This approach recognises that sanitation is both a public and a private good, and that individual hygiene behaviour can affect the whole community: if your neighbours defecate in the open, then your children risk excreta-related disease even when the members of your own household use a sanitary toilet, wash their hands, and practice good hygiene. In this sense, *total sanitation* refers to a total stop on open defecation, which requires that everyone in the community either owns or has access to a sanitary toilet.

The main advantage of the total sanitation approach over conventional policies is that it is a community-wide approach. It requires that every household in the community stops open defecation and uses a sanitary toilet. This approach involves even the poorest and most vulnerable households and ensures that the community and local government

Figure 1. Community social mapping



focus on helping these households gain access to a sanitary toilet with a safe excreta disposal system. This process is the reverse of most conventional sanitation programmes, which tend to favour those who can afford toilets, have land available to build toilets, and are first on the list for subsidised facilities.

How to make it work

The community-led total sanitation approach encourages people to think about total sanitation and to consider what their communities will be like when it is achieved. It is based on the assumption that the community has the strength and willingness to overcome their problems. It recognises that outsiders may be needed to help the community identify their current situation and the need for improvement; however, the community must want to change. Therefore the role of NGO is that of a facilitator enabling communities to:

- analyse their current situation
- identify areas for improvement
- plan how to improve these areas, including training local artisans in low-cost latrine construction
- implement solutions to meet their own needs.

The NGO therefore concentrates on social development using a process of institution building and community empowerment rather than on the delivery of water and sanitation services.

The process of achieving total sanitation in any geographical/administrative area starts at community level, where the community may be a village or

sub-village. The important thing is that the people see themselves as a community whose members affect and support each other. As individual communities within a geographical/administrative area become motivated, neighbouring communities become aware of the improved situation and are motivated to find out about total sanitation. Eventually all communities of the geographical/administrative area are involved and the process to achieve total coverage is in progress.

The success of the approach depends on the level of involvement of individuals within the communities. Initially, the input of the external facilitators may be high as they work to encourage members of the community to get involved. As the process develops, the need for external facilitation will decrease and eventually end. A range of participatory rural appraisal tools are used during the process, for example community mapping (see Figure 1) as the key is to help the community identify and analyse their current situation.

Conclusion

Non-governmental organisations in Bangladesh and other countries report that they have used the total sanitation approach in stopping open defecation, using participatory techniques to raise awareness of local sanitation issues and to assist communities to solve their own problems. The combination of internal community pressure and external NGO support is reported to have enabled thousands of communities to reach total sanitation coverage without any hardware subsidies at household level.



WORMS

Tackling worms in children: school programmes can work – for eyes too



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An estimated 800–900 million children worldwide are affected by intestinal worms. The majority of these live in Asia and Africa.

There are three main types of intestinal worms:

- roundworms (*Ascaris*)
- whipworm (*Trichuris*)
- hookworm (two species: *N. americanus* and *A. duodenale*)

These worms – also known as soil-transmitted helminths (STH) – primarily affect children and women of childbearing age. Infected children may become anaemic and tired, and have difficulty learning. The worms absorb vital nutrients from the intestine, which can affect children's growth, health, and nutrition. Some studies have shown that children with high levels of infection have impaired cognitive (brain) function, which may be reversed by treatment to get rid of the worms.¹ Pregnant women infected with hookworm also may suffer from anaemia, which leads to low birth weight and affects the baby's chances of survival and future health.

Transmission

Intestinal worms are usually associated with poor sanitation, which includes poor access to toilets (latrines) and hand washing facilities. When there is no access to toilets and people defecate in the fields, the soil becomes contaminated. Worm eggs can persist for months or even years in the soil, given the right conditions. Roundworm and whipworm are transmitted when soiled hands contaminated with human faeces come into contact with the mouth (faecal-oral contact). Hookworm larvae penetrate the skin of the feet that come into contact with contaminated soil.

Preventing transmission

The use of well-maintained latrines and hand washing after using the toilet and before eating food are the major health education messages.

Tackling worms

The World Health Organization (WHO) recommends preventive chemotherapy – known as mass

drug administration (MDA) – when the prevalence of worm infection in children is above 20% (i.e. more than 20 out of every 100 children have worms). MDA provides children with a worm-free interval during which they can absorb nutrients from their food and grow. The treatment is repeated every 6–12 months, depending on the intensity of infection in the community. In areas of heavy transmission, it is necessary to treat repeatedly for several years.

School children are often heavily infected with worms and, because schools are easily accessible, treatment and prevention of intestinal worm infections have become part of school health programmes in the countries where this is a problem. One day in every 6–12 months is usually designated as de-worming day and treatment is given together with hygiene and sanitation lessons. The teachers usually hand out the de-worming drugs and ensure the children take them correctly.

At a global level, the de-worming programme has been slow to reach everyone, but this has started to change. Johnson & Johnson and GlaxoSmithKline now give sufficient free drugs to reach all school-age children in the 112 countries where children are at risk of infection. At present, 45 countries are receiving the donated medicines. In addition, the United Nations Children's Fund (UNICEF)

and other organisations provide treatment to pre-school children as part of vaccination or vitamin A supplementation programmes. As a global community, we are now organising and rallying around a common vision for the control of intestinal worms.

Even though de-worming drugs are now available, free of charge, organisational and technical capacity are required to get the drugs to the schools and have them administered effectively. Countries are now preparing their plans of action, which includes not only treatment for intestinal worms (soil-transmitted helminths) but also other neglected tropical diseases. Once the plans have been developed, countries can request drugs for the control of worms through WHO. They need to demonstrate that they have the infrastructure and funding in place to deliver the drugs to rural as well as urban schools, to train teachers to administer the medicines to the children, and to mobilise communities to participate.

There are two major priorities if we are to eliminate worms by 2020:

- 1 Scaling up.** This is particularly important in the larger countries (India, Nigeria, Ethiopia, Indonesia, and Democratic Republic of Congo) so that all the children who need the medication have access to it.
- 2 Sustainability.** As well as increasing MDA coverage, there must be an emphasis on hygiene education. This can be achieved through collaboration with the water, sanitation, and hygiene (WASH) sector. This is critical for prevention of transmission and for long-term success (see page 27).

What can eye care workers do?

Being aware that these school-based de-worming programmes exist and that they provide a health focus for the schools can be helpful. De-worming day can be an excellent platform for other public health interventions, such as health education, or vision screening. Children in school will benefit most from an integrated health package – not just de-worming, not just eye testing – to enable them to live a more healthy life.

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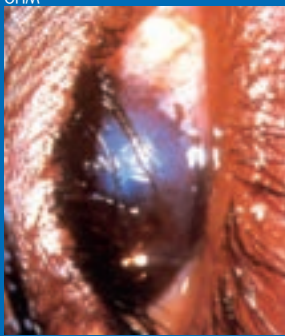
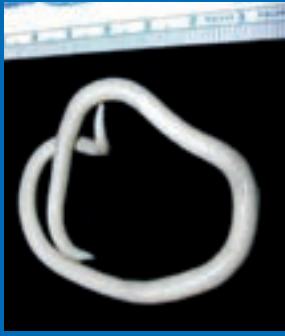
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Kelly Shimoda

Children line up to receive their deworming medicine. NICARAGUA

At a glance: the core neglected tropical diseases (NTDs)

	Trachoma	Onchocerciasis	Soil-transmitted helminths	Lymphatic filariasis	Schistosomiasis
					
	Trachomatous trichiasis	A woman blinded by onchocerciasis	Adult female <i>Ascaris lumbricoides</i> worm	Elephantiasis due to lymphatic filariasis	Dipstick testing to detect haematuria. The sample on the left is negative for haematuria – the other two are both positive
Where	• Africa • Latin America • Yemen • China • India • Australia • South-East Asia • Pacific Islands (see www.trachomaatlas.org)	• Africa • Latin America • Yemen	• Worldwide (see www.thiswormyworld.org)	• Africa, • Asia • Latin America • Pacific Islands (see www.thiswormyworld.org)	• Africa • Asia • Latin America (see www.thiswormyworld.org)
How	• Discharge from infected eyes spreads via fingers, fomites and eye-seeking flies (especially <i>Musca sorbens</i>)	• Acquired by the bite of an infected blackfly (<i>Simulium</i> sp.)	• Eggs are passed out in faeces and then swallowed by another host (<i>Ascaris</i>, <i>Trichuris</i>) or develop into infective larvae and penetrate intact skin (hookworm)	• Acquired by the bite of infected mosquitoes	• Acquired by contact with standing fresh water (e.g. lakes) in which there are infected snails

Who	• Pre-school-age children have the highest prevalence of active trachoma. The prevalence of blindness from trachoma increases with age	• People living near rivers where blackflies breed	• People living in communities with poor access to water and sanitation • People who walk barefoot are at risk of hookworm infection	• Children acquire the infection, but sequelae tend to occur in adults • Children and adults who play, work or undertake chores on the edge of lakes
What	• Inflammation of the conjunctiva (active trachoma) • Conjunctival scarring • Trichiasis • Corneal opacification	• Nodules under the skin • Pruritus • Thickening of skin or loss of skin pigment • Punctate keratitis • Sclerosing keratitis • Uveitis • Chorioretinitis • Optic atrophy	• Often asymptomatic • May contribute to anaemia leading to fatigue and lethargy	• Often asymptomatic • Enlargement of the limbs, genitals or breasts, with secondary skin changes • Acute infection: fever, itchy rash • Chronic infection: often asymptomatic; haematuria, renal failure, bladder cancer (urinary schistosomiasis); liver failure (intestinal schistosomiasis)
Test	• Clinical diagnosis	• Skin snip • Slitlamp examination of eye	• Stool microscopy for eggs	• Examination of night blood smear for microfilariae • Urine/stool microscopy for eggs
Treat	Individual: • Tetracycline eye ointment twice daily for 6 weeks, or single dose azithromycin, 20mg/kg (maximum 1g), for active trachoma • Surgery for trichiasis Population: • SAFE strategy	Individual: • Ivermectin 150µg/kg once a month for 3 months Population: • Mass distribution of ivermectin	Individual: • Single dose albendazole 400mg Population: • Mass distribution of albendazole or mebendazole. • Improved access to safe methods for disposal of human faeces	Individual: • Albendazole 400mg for 21 days • Washing of swollen parts to reduce risk of secondary infection and progression of elephantiasis Population: • Mass distribution of DEC+albendazole, or (if onchocerciasis co-endemic) ivermectin + albendazole Population: • Mass distribution of praziquantel • Improved access to safe methods for disposal of human faeces • Education



Mapping neglected tropical diseases: a global view



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The word 'mapping' can be used to describe the collection of data that is linked to a geographical location. Today, such maps are developed using a geographical information system (GIS). This is computer software which allows the capture, storage, analysis and presentation of spatial data.

Maps are important for designing and implementing interventions targeted at the control and elimination of diseases, including neglected tropical diseases (NTDs). For those NTDs which are targeted for elimination, such as onchocerciasis and lymphatic filariasis (LF), it is essential to know where transmission occurs and when it has been successfully halted following control initiatives. For those NTDs where disease control is the goal, including trachoma, soil-transmitted helminths (STH) and schistosomiasis, interventions are most cost-effective when they are focused in areas with the highest prevalence of infection. In addition, NTD maps can be linked to population data to derive estimates of disease burden and numbers requiring intervention – information essential for estimating programme costs.

Today there are a number of GIS-based initiatives that provide information on the geographical distribution of NTDs. One of the first mapping initiatives was that of the African Programme for Onchocerciasis Control (APOC), which developed the rapid epidemiological



A health worker examining children during a trachoma survey. TURKANA

mapping of onchocerciasis (REMO) approach. REMO quickly and cheaply identifies priority areas for community-directed treatment with ivermectin, and estimates the numbers of individuals requiring treatment. To date, 23 African countries have been mapped using this approach.

APOC has also mapped the distribution of *Loa loa* (tropical eye worm). These maps indicate areas where the prevalence of *Loa loa* exceeds 40%. People with high *Loa loa* parasite loads are at high risk of severe adverse events following ivermectin treatment (used for treatment of onchocerciasis and LF).

The mapping of LF has been greatly facilitated by the use of immunochromatographic (ICT) card tests to detect circulating *Wuchereria bancrofti* antigens. This enables large-scale assessments of the boundaries of filaria-endemic areas, so areas requiring MDA can be identified. Providing better overlay maps of onchocerciasis, *Loa loa* and LF will help the design of better integrated LF and onchocerciasis control programmes.

By contrast, the mapping of STH and schistosomiasis has been more ad hoc, with surveys conducted by a range of academic and government partners using

a variety of methodologies. The *Global Atlas of Helminth Infections* (GAHI) aims to collate available data on STH and schistosomiasis, as well as LF into a single resource in order to describe their global distribution and prevalence.¹ The assembled data are useful for a number of epidemiological purposes, such as estimating the number of people infected with these NTDs and using modern statistical methods to predict the distribution of infection in unsampled areas.² The maps can also highlight where further survey data are required. The GAHI web site allows users to visualise the assembled data and models, download the maps, and access the sources and underlying data.

The Global Atlas of Trachoma (GAT) is a collaborative initiative that provides an open access platform for maps of the distribution of trachoma at sub-national levels. This work is intended to provide an evidence base for allocating resources for trachoma control, including surgery and administration of azithromax, as well as to identify where further mapping is required. To address these gaps, GAT is partnered with the UK's Department for International Development (DFID)-funded Global Trachoma Mapping Project. This project uses the latest smartphone technologies to collect trachoma survey data and automatically compiles them into a linked database that allows maps to be quickly updated.

There are other NTD mapping initiatives, including the Global NTD Platform, Atlas of Human African Trypanosomiasis, Leishmaniasis e-compendium, and the WHO's global health repository, as well as efforts by WHO regional offices (see panel).

These various NTD mapping initiatives and atlases rely on contributions from the wider NTD community – revision and improvement requires further information on the prevalence of infection within countries. If you know of relevant data that could be included, or if you would like to be a partner in the initiatives, then please contact the relevant projects.

SJB is supported by a Wellcome Trust Senior Fellowship in Basic Biomedical Science (098045) and acknowledges support from the Bill & Melinda Gates Foundation. JLS is supported by a grant to the International Trachoma Initiative from the Bill & Melinda Gates Foundation.

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Online resources on the geographical distribution of NTDs

African Programme for Onchocerciasis Control (APOC):

www.who.int/apoc/countries/en/

Loa loa maps:

www.who.int/apoc/raploa/en/index.html

Global Atlas of Helminth Infections (GAHI):

www.thiswormyworld.org

Global Atlas of Trachoma (GAT):

www.trachomaatlas.org

Global Neglected Tropical Disease platform:

www.gntd.org

Atlas of Human African Trypanosomiasis:

www.who.int/trypanosomiasis_african/country/foci_AFRO/en/index.html

Leishmaniasis e-compendium:

<http://apps.who.int/tools/geoserver/www/ecompendium/index.html>

WHO's Global Health Repository:

www.who.int/gho/neglected_diseases/en/index.html

Contact information

Global Atlas of Helminth Infections (GAHI):

www.thiswormyworld.org/contact-us

Global Atlas of Trachoma (GAT):

www.trachomaatlas.org/about-us/contact-us



A coordinated approach to mapping neglected tropical diseases



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Disease prevalence mapping allows countries to identify infected individuals and populations in need of disease-control measures, such as mass drug administration (MDA) with preventive chemotherapy. For countries with unlimited time and resources, disease-specific prevalence mapping may be carried out in a slow, careful manner, by large teams of diagnostic technicians, supervisors, and drivers. These mapping protocols, established by the World Health Organization (WHO), are intended to be carried out independently, by each respective disease-control programme, in order to assess prevalence of neglected tropical diseases (NTDs) in individual populations. They work particularly well in areas endemic for one NTD.

In reality, the countries most affected by NTDs have limited resources for mapping, and are endemic for two or more NTDs, for example lymphatic filariasis (LF), and/or trachoma, and/or schistosomiasis and/or soil transmitted helminths (STH). For these countries, with efficiency and field-practicality in mind, the coordinated threshold mapping (CTM) method was developed. The method enables coordinators from two or more disease programmes to work together to determine the prevalence of two or more diseases in a population, at one time. The CTM method achieves the same goals as the WHO's disease-specific protocols, namely identifying the need for MDA with preventive chemotherapy. It does not



Els Mathieu

After giving stool and urine samples (to detect soil-transmitted helminths and schistosomiasis, respectively) the children are checked for signs of trachoma. TOGO

provide prevalence figures, but instead aims to determine whether a disease has attained the threshold necessitating a public health intervention.¹ Therefore, rather than carrying out simultaneous, independent mapping efforts in areas endemic for more than two NTDs, at a high cost to the national control programmes, the CTM method saves countries precious time (smaller sampling size) and resources (fewer survey team members). Table 1 gives a comparison of disease-specific prevalence mapping and CTM.

It is the responsibility of a national-level coordinator to work together with the coordinators of the various NTD control programmes to compile historic data that will determine areas where NTDs are suspected to be endemic. Once the areas in need of NTD prevalence mapping have been identified, a protocol is agreed upon at the national level. In the CTM method, each disease module uses the WHO-recommended standard indicators and diagnostic methods (Table 2), and is field-tested and independent. As such, a

Continues overleaf ➤

Table 1: Advantages and disadvantages of disease-specific prevalence and coordinated threshold mapping

	Disease-specific prevalence mapping	Coordinated threshold mapping (CTM)
Advantages	- Workers in each disease programme are accustomed to working independently, managing their own budgets and personnel - Diseases differ in their geographical distribution; some are more localised (schistosomiasis, onchocerciasis) while others occur widely (trachoma, soil-transmitted helminths, lymphatic filariasis) - Produces disease prevalence data for trachoma - Reveals whether threshold for public health intervention has been surpassed	- Workers share logistical responsibilities, reducing the burden on each programme and allowing them to achieve disease-specific, non-mapping objectives - Employs smaller survey teams thus encouraging each team member to perform multiple tasks – saving money and better utilising broadly trained technicians - Reveals and improves understanding of occurrence of co-infections among individuals within the population - Unites NTD control programmes with respect to public - Encourages involvement of community members – building local capacity and local advocacy - Reveals whether threshold for public health intervention has been surpassed
Disadvantages	- Mapping efforts must be mobilised independently - Each NTD control coordinator has responsibility of disease mapping	- Does not produce precise prevalence data for trachoma - Increases responsibility of all survey team members

protocol is built to suit the particular mapping needs of a country simply by adding each of the disease modules together as needed. Mapping needs within a country may differ by region or district, which can easily be accommodated within the CTM.

Next, a CTM team is formed, including: one supervisor (usually selected from among the national-level NTD-control programme coordinators), and one or two diagnostic technicians per NTD to be mapped. The team members are selected for their demonstrated expertise and independence in NTD diagnosis, as well as for their prior field experience and enthusiasm for collaboration. Team members will be trained in CTM methodology, sampling, questionnaires, data collection tools, and in obtaining informed consent.

The CTM team (supervisor and diagnostic technicians) travels in one vehicle to survey two villages in each subdistrict each day. Depending on which diseases are being mapped, some combination of the following activities takes place: trachoma examinations, stool collection, urinalysis, and LF testing (during the day) as well as examination of stool samples (Kato-Katz method) in the evening. Community health workers, teachers, and village chiefs are encouraged

by the NTD control programme coordinators to assist with bringing participants to a central location, then organising and registering them. This participation of local volunteers has been shown to build local capacity and spontaneous local advocacy for co-ordinated NTD control.⁶

Co-ordinated (or integrated) mapping surveys have been successfully implemented in several countries, including for schistosomiasis and trachoma in Nigeria⁷, for schistosomiasis, STH and trachoma in Togo⁶; for LF, loiasis, schistosomiasis and STH in South Sudan^{8,9}, for trachoma, LF, schistosomiasis and STH in Mali and Senegal¹; and for schistosomiasis and STH in Cameroon.¹⁰

Although CTM offers several important advantages over the WHO's disease-specific protocol for countries that are endemic for more than one NTD, the method is not without shortcomings (Table 1). However, the various NTD programmes share the common goal of a healthier, more productive population. By working together in disease mapping, this common goal is more attainable. In our experience, the initial reluctance towards collaboration among different NTD programmes was eased as members quickly noticed improved efficiency compared to disease-specific methodologies.¹

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Table 2: Diagnostic methods thresholds used in coordinated threshold mapping (CTM). These are the same as those recommended by the WHO, except for trachoma: the protocol for this disease was adapted in collaboration with the International Trachoma Initiative

Disease	Diagnostic method	Thresholds for different public health interventions
Trachoma ²	Clinical examination using the WHO Simplified Trachoma Grading System	Follicular trachoma (TF) present in ≥10% of children examined (1–9 years old)
		TF in ≥5 of children examined (1–9 years old)
		Trichiasis present in ≥1% of adults (≥15 years old)
Onchocerciasis ³	The prevalence of nodules is determined via the rapid epidemiological mapping method (REMO); or the presence of <i>Onchocerca volvulus</i> microfilaria is determined via skin snip	For control: presence of palpable nodules in ≥20% of adults tested (≥15 years old)
		For elimination: prevalence of palpable nodules in ≥5% of adults tested (≥15 years old)
Lymphatic filariasis (LF) ⁴	Immuno-chromatographic card test (ICT) to determine the presence of daytime antigenemia	Present in ≥1% of adults tested (≥15 years old)
Soil-transmitted helminths (STH) ⁵	Kato-Katz method to look for presence of eggs in stool	Present in ≥50% of children tested (5–14 years old)
		Present in ≥20% and <50% of children tested (aged 5-14 years)
Schistosomiasis ⁵	Schistosoma mansoni: Kato-Katz method to look for presence of eggs in stool.	Present in ≥50% of children tested (aged 5–14 years) if based on parasitological methods; or ≥30% if based on questionnaires for visible haematuria
	Schistosoma haematobium: Reagent strips (urinalysis) to look for blood in urine and administer questionnaire or urine filtration to look for eggs in urine	Present in ≥10% and <50% if parasitological methods; or >1% and <30% if based on questionnaire for visible haematuria in children aged 5–14 years
		Present in ≥1% and <10% (if based on parasitological methods) in children aged 5–14 years



Coming together to address neglected tropical diseases



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The NTD NGDO Network¹ provides a global forum for non-governmental development organisations (NGDOs) and a wide range of other partners to share information and approaches on the elimination, prevention and control of neglected tropical diseases (NTDs).

The primary mission of the network is to coordinate the activities of members in an attempt to bridge gaps in funding and programme support to endemic countries. The NTD NGDO Network is not a fundraising organisation, as the individual members will continue to raise funds to support specific activities. Rather, it is a convener and facilitator.

The NTD NGDO Network has a number of specific objectives.

- To increase the expansion and effectiveness of advocacy for NTD control by giving NGDOs a unified voice at national and international levels on:
 - comprehensive elimination and control programmes
 - community ownership
 - integrating with development programmes
 - strengthening health systems.
- To facilitate the formation of partnerships among the group's members at the international, regional, and national levels.
- To provide a mechanism for coordination of NGDO activities at national and international levels in order to:
 - avoid duplication of efforts
 - identify opportunities for synergy
 - track progress towards goals
 - identify operational research needs.
- To share technical updates, develop and uphold best practices, and contribute to WHO guidelines to:
 - control and/or eliminate individual NTDs
 - integrate NTD activities
 - promote and support comprehensive NTD control and prevention programmes
 - standardise systems and practices.
- To present, with a unified voice, the common interests and concerns of



A community directed distributor. NIGERIA

implementing NGDOs in mechanisms being established for the mobilisation of resources for the implementation of elimination programmes.

- Through its members, to support the development and maintenance of national task forces in NTD endemic countries and assist them to:
 - develop and implement national plans
 - identify gaps and coordinate strategies to meet implementation resource shortfalls.

What does the NGO NGDO Network do?

During the Network's third annual meeting in Sydney, Australia in September 2012², the NTD NGDO Network declared its full and unanimous support for the London Declaration on Neglected Tropical Diseases (The London Declaration).³

The members of the NTD NGDO Network have a long history of working with people affected by NTDs and have been among the major innovators in mass drug administration (MDA) for almost 25 years. NGDOs have facilitated the distribution of over 400 million treatments of preventive chemotherapy worldwide in 2011.

NGDOs are critical players in global health, and are uniquely placed, given their field-based programmes and experience, to reach the most under-served – those neglected people that The London Declaration is pledging to reach.

As part of our commitment to the London Declaration, the members of the Network will support the following:

- the finalisation of baseline disease mapping: this is a critical issue to achieve the scale-up of treatment
- the scaling up of mass drug administration coverage: the treatment coverage

globally is not reaching the 75% global coverage rate required

- programming solutions to NTDs which will be informed by clinical and operational research
- the building of local capacity which will ensure effective scale-up to achieve elimination targets
- the integration of water, sanitation and hygiene (WASH) programmes into NTD programmes where appropriate. WASH elements are crucial, but often underplayed, elements of the elimination and control of NTDs
- strengthening of health systems, especially at community level
- scale-up of efforts to address the need for surgical intervention, home-based care, and stigma reduction for those suffering from NTDs. NTD programmes need to go beyond MDA
- a commitment to ensuring that neglect is not perpetuated because of someone's gender or disability, whether by denying access to treatment, prevention or morbidity control
- the development of clear guidelines as to where and when to stop treatment. These are essential if elimination targets are to be achieved.

How to get involved

The next annual meeting will be held in Brighton, UK, 18–20 September 2013, and will include disease-specific meetings on onchocerciasis, trachoma, lymphatic filariasis, schistosomiasis and soil transmitted helminths. The agenda of the meeting will focus on those countries with a high burden of NTDs and the role of NGDOs in achieving the scale-up of treatments. There will be a day to discuss the link between NTDs and sanitation as well as a look at the impact of NTDs on disability and the need to scale-up morbidity control programmes as part of the elimination agenda.

To register for this event go to <http://www.amiando.com/GCLEMDC>

Simon Bush has been the chair of the NTD NGDO Network for the last two years. He hands over to Kim Koporc (Children Without Worms) in September 2013.

References

- 1 For members of the NTD NGDO Network, refer to www.ntd-ngdonetwork.org
- 2 For information and copies of presentations from the meeting, refer to <http://www.hollows.org.au/nnn-forum>
- 3 For the London Declaration, refer to www.unitingtocombatntds.org

How to handle and care for bulbs in ophthalmic



Ismael Cordero

Clinical engineer

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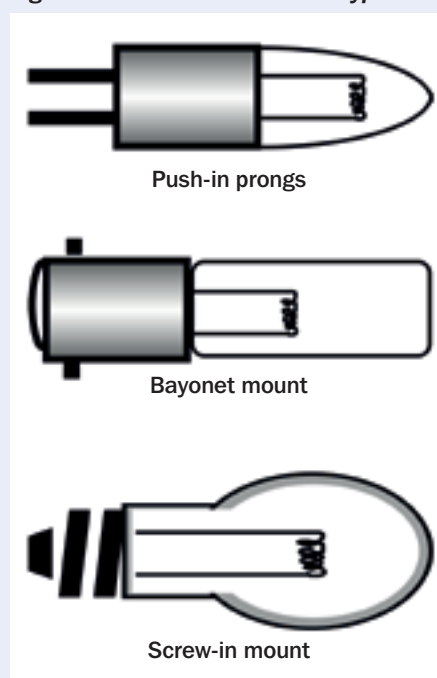
Many devices used in eye care rely on light bulbs or lamps for their operation. All light bulbs have a limited lifespan and when the bulb fails the device becomes unusable. Therefore, knowing how to handle, how to inspect and how to replace bulbs is important. Just as important is keeping spare bulbs to hand!

Prolonging the lifespan of bulbs

The lifespan of a bulb varies widely among different types of bulbs and also will depend on the particular application and the environment in which it is used, among many other factors. To help ensure the longest bulb life possible you should follow these guidelines.

- Turn on the equipment at the lowest light intensity setting. Sudden high voltage surges can blow bulbs, especially when cold.
- Use the equipment at lower light intensity settings as much as possible.
- Turn off the bulb or equipment when it is not being used.
- Don't move a device while the bulb is still lit or hot: wait until the bulb has cooled. Even gentle vibrations may cause a hot bulb filament to break since they are more brittle when hot.
- Each time you turn the unit on, a current surge stresses the bulb's filament. The more often this stress is applied the sooner the bulb will fail. For this reason, turning the equipment on and off frequently is not recommended.
- Inadequate cooling can cause the bulb envelope seal to fail or the bulb capsule to swell. Make sure that the fan, if included, is operating and that the intake and exhaust vents are not blocked. Keep the filters clean and the

Figure 1. Different connection types



Ismael Cordero

especially if it is a halogen bulb – will be very hot and could burn your fingers. You should allow sufficient cooling time and use a cloth or a suitable heat insulator to hold the bulb.

- Do not touch the new bulb directly with your fingers; use tissue or cotton gloves. If the bulb is touched accidentally, it should be wiped clean with a cloth moistened in alcohol to remove potential skin oil deposits. These deposits can burn into the glass, creating shadows and weakening the glass, and causing premature failure.
- Know how each specific bulb fits into its socket (Figure 1).
- When installing bulbs, be sure the lamps are secured completely. The tendency is to stop at the first sign of resistance. Continue to carefully apply force at the base of the lamp until you are sure the lamp is secure. Improper installations will cause electrical arcing, overheating and shorten the lifespan of both lamp and socket.
- Check that the filament is correctly aligned to ensure that the light projected is of even intensity.
- Replace a defective bulb with the identical type (same shape, voltage and wattage). Some bulbs may look very similar but may have quite different heat characteristics that could cause damage or fire risk. The two bulbs in Figure 2 look alike and can both fit into the same type of socket, but one is a 12 volt/35 Watt bulb, while the other is a 120 volt/25 Watt bulb. Also, the filaments have different shapes and will yield different light profiles.

area around the equipment free from objects that might restrict airflow and create heat.

- High power line voltage is a major cause of short bulb life. Typically an increase of 5% in the voltage supply above the bulb's rated voltage can reduce its lifespan by 50%.
- Oils and other stains on the bulb's glass can create hot spots that can cause the bulb to fail. You should avoid touching bulbs with your bare fingers.
- Pitting, corrosion or other damage in the bulb socket's contacts will cause inconsistent current and will shorten the bulb's life. Replace damaged sockets.

Removing and installing bulbs

- Shut off the instrument and unplug it from the electrical outlet.
- Let the bulb cool before removing it. You should remember that the bulb –

Inspecting bulbs

- Check for bent or sagging filaments as these indicate imminent failure.
- Inspect the filament for continuity and welding points. Loose filaments will produce a blue arc of light and flickering.

Figure 2. Similar but different bulbs



Ismael Cordero

Figure 3. Bulb stock can be kept in a container and labelled as shown

Instrument(s): Optix 9L-50 and 9L-150 slit Lamps
Details: Osram 7215, 6 volts, 150 watts
Vendor: Bulb City, 19 South Bank Street, Singapore. Tel: 6779533
Part Number: 142566-3
Price: \$32.50 per bulb
Minimum/maximum stock levels to be kept*: 3/9

*(Reorder when minimum quantity is reached)

How to measure the pulse



Dianne Pickering
Former Nurse Advisor,
Community Eye Health Journal
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Before surgery, eye patients must be assessed for their suitability for surgery. Taking the pulse allows us to find out what the patient's heart rate is and to assess the strength, regularity, and character of the pulse. Irregularities might indicate a heart problem and must be investigated.

Taking the pulse also provides an initial recording (a 'baseline') that will enable us to compare future measurements and monitor changes in our patient's condition.

The pulse can be measured at several points in the body. These points are where an artery is situated just under the skin, where it can be compressed against a bone, allowing us to feel each beat.

This article will cover the measurement of the pulse at the radial point (inside the wrist, see Figure 1) as this is the most common point at which to measure the pulse of eye patients.

NOTE: Many things – such as anxiety, pain and fever – can raise the patient's pulse (heart rate) and certain medications such as beta blockers or digoxin can lower it; all of these reasons should be considered when assessing and recording the patient's pulse. If you are taking repeat measurements of the same patient, try to measure the pulse under the same conditions each time.

What is normal?

A normal pulse is regular and strong. Heart rates, and therefore pulse rates (number of beats per minute) change with age and can vary between individuals of the same age.

Table 1: Normal pulse rate range, by age

Age	Pulse rate (beats per minute)
Newborn (resting)	100–180
Infant (resting)	80–150
Child 2–6 years	75–120
Child 6–12 years	70–110
Adolescent–adult	60–90

You will need

- A watch that has a second hand
- A chart to record the pulse measurement
- A black pen.

Before you begin

- 1 Wash your hands – this will help to prevent cross-infection.
- 2 Explain what you are about to do. This will help the patient to understand what is about to happen and will make it easier for them to co-operate.



Figure 1

Procedure

- 1 Ask whether the patient has walked, climbed stairs, or otherwise exerted themselves in the last 20 minutes. If not, you can proceed. If the answer is yes, wait 20 minutes before taking the reading. This will help to prevent false readings.
- 2 Make sure the patient is relaxed and comfortable.
- 3 Place the tips of your first and second finger on the inside of the patient's wrist (Figure 1).
- 4 Press gently against the pulse. Take your time to note any irregularities in strength or rhythm.
- 5 If the pulse is regular and strong, measure the pulse for 30 seconds. Double the number to give the beats per minute (e.g.: 32 beats in 30 seconds means the pulse is 64 beats per minute). If you noticed changes in rhythm or strength, you must measure the pulse for a full minute.
- 6 Record the pulse rate (the number of beats per minute) in the patient's notes and describe its strength and rhythm. Compare the pulse rate with the values in the Table 1 and record whether the pulse is normal, slow or fast. Any abnormalities should be recorded and reported to the senior nurse and doctor.
- 7 Strength of the pulse is a very subjective measurement, but an experienced nurse will compare it with what has been felt previously in other patients. Describe the pulse as 'weak', 'faint', 'strong' or 'bounding'.
- 8 Think about the rhythm of the pulse. Is it regular? If irregular, in what way? Cardiac problems may present as a regular missed beat, for example, so is the irregularity regular (described as regularly irregular) or is there no pattern (described as irregularly irregular)?
- 9 Discuss with your patient the result of the pulse measurement and if any further investigations are required.
- 10 Wash and dry your hands.

Sources

Nursing and midwifery: a practical approach. Sally Huband, Pam Hamilton Brown and Gillian Barber Macmillan Education
Royal Marsden Hospital Manual of Clinical Nursing Procedures

www.clinicalskills.net

equipment

- A metallic haze on the inside of the glass envelope of the bulb signifies evaporation of the filament, precedes filament failure, and also reduces the lamp's brightness.
- Inspect the bulb's contacts for corrosion. Sometimes it is possible to remove the corrosion with a file or sandpaper.

Maintaining a bulb inventory

- Based on the number of instruments you have that require a specific type of bulb, and on how often you replace this type of bulb, you should purchase and store replacements in clearly labeled containers. Figure 3 shows one way to label the bulb containers.

General handling and safety precautions

- Always turn off the electrical power before inserting, removing, or cleaning a bulb.
- Always handle bulbs with care and store them appropriately to minimise the likelihood of glass breakage. If you do break a bulb, please remember that some contain harmful substances and should be handled accordingly. Incandescent bulbs pose little or no threat except that of the broken glass and can be dealt with as regular waste. Fluorescent tubes and most discharge bulbs can contain potentially harmful chemicals that should be handled with care and disposed of in accordance with your local waste authority rules and health and safety policies.
- Bulbs should be easy to install and remove from their fittings and should never be forced as this can often result in breakage of the glass.
- Many bulbs contain gases at either greater than or less than atmospheric pressure and may either explode or implode if the glass is broken. This can cause a significant hazard. Bulbs should not be disposed of by breaking them unless appropriate protective equipment is used and environmentally sound disposal methods are followed.
- Do not use halogen or other hot burning bulbs near paper, cloth or other combustible materials that can catch fire.
- Do not look directly at an operating bulb for any period of time; this may cause serious eye injury.

Mass treatment for trachoma: how does it all work?



Hillary K Rono
Ophthalmologist, Kitale District Hospital, Kitale, Kenya.

Trachoma is the leading infectious cause of blindness and is endemic in 53 countries. An estimated 325 million people live in areas where they can be exposed to trachoma, and more than 7 million suffer from trichiasis, the final painful stage of this eye disease.

The World Health Organization (WHO) initiated a global programme to eliminate trachoma by 2020. At its core is the SAFE strategy: **S**urgery, **A**ntibiotics, **F**acial cleanliness and **E**nvironmental improvement to reduce transmission. Trachoma control efforts have increased with mass drug administration (MDA) of azithromycin (Zithromax), an antibiotic donated by Pfizer Inc. The goal is 80% coverage in endemic areas for at least 3 years.

To maximise coverage, programme managers and health workers must understand the community’s knowledge and health priorities as well as their attitudes and beliefs.

This has been well demonstrated in other successful public health programmes in Africa, e.g. the Africa Program for Onchocerciasis Control (APOC)¹ and the Guinea Worm Program (GWP).²

This article distils what has been learned from MDA programmes in Kenya, where trachoma control activities have been initiated in eight districts.

Successful MDA programmes depend on completing all of the following activities in each district where MDA will take place.

1. Planning

Health workers in managerial positions, also referred to as the District Health Management Team (DHMT), gather to do the following:

- choose drug distribution points and drug storage sites
- determine the target population for each location and distribution point
- procure the drugs (azithromycin)
- determine the human resources needed
- select divisional coordinators and supervisors
- prepare the distribution budget
- meet with the partner(s) supporting MDA, which may be an NGO and/or a district or regional authority.

2. Sensitisation of stakeholders and mobilisation of the community

The DHMTs are responsible for creating awareness about MDA. This is aimed at everyone involved in – and affected by – the MDA programme.

In each division (a population of around 50,000 people) the DHMT organises workshops with local chiefs and assistant chiefs and ask them to encourage their communities to get involved. The staff member designated as the divisional coordinator explains the purpose of the MDA, the reasons for choosing this area, and the drugs being used. They also discuss the potential side effects of the drugs to dispel negative information and perceptions.

We have found that it is best to engage everyone in discussion, rather than merely



Hillary K Rono

A community health extension worker (CHEW) in Kataboi dispensary, Turkana County, gives azithromycin to a child during mass drug administration. KENYA

giving a lecture. This gives community members a chance to express any fears or concerns they may have.

If there are several ethnic groups in the target area these may need different approaches in order that they understand and participate in distribution. Protecting the future generation from disease is a message that resonates well in most communities.

Speaking to faith-based organisations about MDA, and engaging the local media and opinion leaders, are also important in getting a community ready to actively support distribution and to accept the drugs. This is also known as community mobilisation. Community Health Extension Workers (CHEWs) in the area will assist by educating the community about the importance of hygiene and sanitation.

3. Recruitment of volunteers and community mapping

First, the DHMT members involved in managing the MDA meet to discuss the number of CHEWs and community volunteers needed (Table 1) and what training they might require. Chiefs, assistant chiefs, and local opinion leaders help to choose the community volunteers. In communities where there are already trained community health workers, the community volunteers will be chosen from among them.

Community mapping involves assessing the population in an area and identifying public facilities such as schools, clinics and churches that can be used as distribution points. Distribution dates are determined, based on places or activities that bring people together, such as market days.

Table 1: Personnel involved in MDA at district level in Kenya

District Health Management Team (DHMT). The team of health managers and leaders who oversee mass drug administration in a district (population of 300,000 to 600,000). Divisional coordinators and some supervisors are also members.
Divisional coordinator. Responsible for training of community volunteers and CHEWs and for community mobilisation in the division (population of around 50,000 people). Oversees the activities of 8–10 supervisors during MDA.
Supervisor. Oversees 6–10 distribution teams in one location (population of around 10,000 people). Liaises with chiefs and assistant chiefs and helps to ensure logistical support is available to teams. Reports to divisional coordinator.
Community Health Extension Workers (CHEWs). They are trained nurses and/or public health officers or technicians who work at the health facilities (dispensaries and health centers) in the community. They are employed by the health system and are the primary contact between the community and health system.
Community volunteers. They are community members, chosen by their community, who offer their services as volunteers. They are concerned with the welfare of the people in relation to improving health and preventing illness.

4. Training community health extension workers and community volunteers

Training CHEWs and community volunteers before MDA ensures smooth implementation. There are three phases of training. The first two-day training session is for divisional coordinators and supervisors from all over the district that will carry out MDA. The second two-day training session is for CHEWs, who are team leaders at the distribution posts. Finally, there is a one-day training session for community volunteers.

Everyone is taught about trachoma and SAFE, the trachoma situation in the country and respective districts, the pharmacology of azithromycin (with emphasis on uses, doses and possible side effects), the mapping of the distribution area, dosing of azithromycin and the use of the height stick, writing patient details, and how to write the daily summary reports. The different duties of the divisional coordinators, supervisors, CHEWs and community volunteers are then clearly explained to each respective group.

5. Mass treatment

The CHEWs are responsible for all activities at the treatment posts. These include identifying the areas that have not been visited. In cases of side effects or adverse drug reactions, CHEWs give first aid and notify the Ministry of Health immediately.

During the MDA, a CHEW is paired with two community volunteers. One volunteer measures the height of each person who will receive treatment to establish the appropriate dose, and the second volunteer records the personal details and the dose the person will receive. The antibiotic (azithromycin) is administered by the CHEW according to height, and older people are also examined for trichiasis. At the end of each day the CHEW tabulates the number of people treated and the drugs used as well as any wastage, and sends the daily summary to the supervisor.

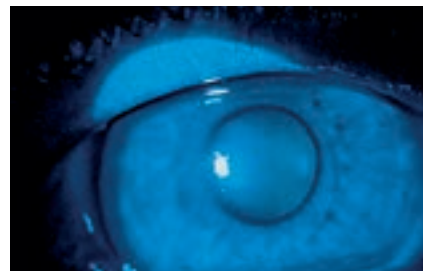
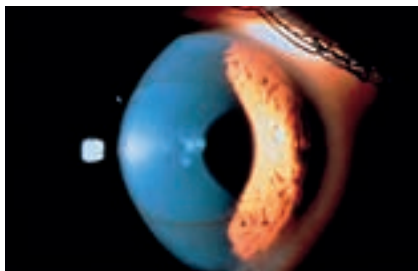
The supervisors and divisional coordinators have broadly similar roles, just at different levels. They work together to ensure every team has enough azithromycin to ensure smooth distribution and that unused drugs are returned to a central store. Supervisors collate the reports submitted by teams and send them to the coordinator they report to. Coordinators collate all the supervisor reports and send them to the DHMT.

References

- 1 Okeibunor JC, Amuyunzu-Nyamongo M, Onyeneho NG, Tchoukue YF, et al. Where would I be without ivermectin? Capturing the benefits of community-directed treatment with ivermectin in Africa. *Trop Med Int Health* 2011;16(5):608–621.
- 2 Cairncross S, Braide EI, Bugri SZ. Community participation in the eradication of guinea worm disease. *Acta Trop* 1996;61(2):121–136.

PICTURE QUIZ

Diagnose this



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A 19-year-old college student complains of poor vision. He states that he has long been nearsighted but that his glasses have recently required several changes, and even with his most recent correction, he is having difficulty. Examination reveals a best-corrected acuity of 20/40 with spectacle correction. The results of slit lamp biomicroscopy are shown.

What is the most likely diagnosis?

- ☐ Keratoconus ☐ Pellucid marginal degeneration
☐ Terrien's marginal degeneration ☐ Keratoglobus

ANSWER

configuration is that the patient presents with progressive and marked against-the-rule astigmatism. Generally, there is no circular iron deposition or apical reticular scarring as in keratoconus. Keratoglobus is a diffuse thinning of the ocular coats, including cornea and sclera. Patients with keratoglobus often have a markedly steepened cornea, a blue sclera, and a tendency for corneal rupture with trauma. There is also an association with collagen fragility syndromes. Terrien's marginal degeneration is an inflammatory condition that includes peripheral vascularisation, intracorneal lipid deposition, and noncellular thinning and ectasia of the corneal periphery.

The patient's history and corneal appearance on biomicroscopy are most consistent with keratoconus. Progressive myopia, multiple spectacle or contact lens changes, and a qualitatively unsatisfactory best-corrected acuity suggest early keratoconus. The presence of a distinct Fleischer ring representing iron deposition at the level of the basal epithelium is diagnostic of this disorder. Pellucid marginal degeneration is a distinct disorder in the spectrum of noninflammatory ectasias of the cornea; however, it differs from keratoconus in that the thinnest area of the cornea is not at the apex of the cone, but rather in a crescentic distribution near the inferior limbus. The effect of this pathologic

Keratoconus is the most likely diagnosis.

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EXCHANGE

Clinical case study

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A 35-year-old man presented at our eye clinic with a 2-day history of a red, sore and watery right eye. He had visited Cameroon 4 months prior to presentation.

Examination of the right eye revealed an injected conjunctiva and a coiled, mobile and translucent worm in the sub-conjunctival space (Figure 1). A diagnosis of loiasis was made on the basis of clinical examination, parasitological analysis, a full blood count (which revealed eosinophilia) and a blood film (which showed microfilaria).

Removal of the worm (*Loa loa*) was attempted using an aseptic technique and minimal illumination. A sub-conjunctival injection of 2% lignocaine and 1:100,000 dilution of adrenaline

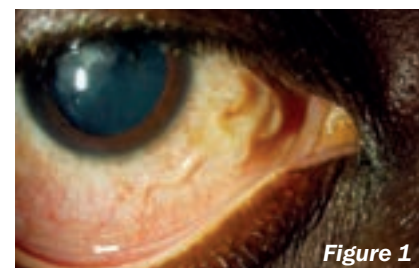


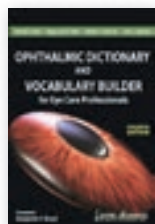
Figure 1

Irfan Jeeva

was used to anaesthetise the eye and a 2 cm horizontal conjunctival incision was made. Despite multiple attempts to grasp the worm with forceps, it could not be extracted due to its slippery exterior. Gentle cautery was applied to seal the space around the worm and facilitate removal. Topical antibiotic was then applied and the conjunctiva closed with 6/0 vicryl. Within a week, the patient's ocular symptoms improved.

Loa loa is a filarial nematode with a predilection for ocular tissues. With increasing international travel it is important that ophthalmologists become familiar with the various ocular presentations of infectious diseases, which untreated can cause serious morbidity and mortality.

Book review



Ophthalmic Dictionary and Vocabulary Builder for Eye Care Professionals, 4th edition

Reviewed by
Nick Astbury

This reference book informs the reader about the context and derivations of words, so helping to build up a rounded knowledge of the ophthalmic vocabulary. The book is illustrated throughout with line drawings and colour photographs.

Personally I miss seeing Snellen acuity expressed in metres (6/6) but I realise that this is an American text; however, it would be useful to include a LogMar equivalent under the estimation of visual acuity. A reference to small incision cataract surgery would also be helpful, considering its widespread use in low- and middle-income countries.

This remains a professionally written, practical and informative dictionary and vocabulary builder which would sit comfortably on the bookshelf of any ophthalmic technician, eye care professional, administrator, or editor.

Cost: UK £38. To order, visit www.jpmedpub.com and enter the discount code CEHJ23 to get a 20% discount, or email orders@nbninternational.com or call +44 1752 202-301 and give the same discount code. Valid until 31/10/13.

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Kilimanjaro Centre for Community Ophthalmology (KCCO), Tanzania

Contact Genes Mng'anya, KCCO Tanzania Limited PO Box 2254, Moshi, Tanzania. Tel: +255 27 275 3547 or visit www.kcco.net

Lions SightFirst Eye Hospital, Nairobi, Kenya

Small incision cataract surgery for ophthalmologists wishing to upgrade from

ECCE. Duration: 6 weeks. Cost: US \$1,000 for tuition and US \$945 for accommodation and meals. Write to: The Training Coordinator, Lions Medical Training Centre, Lions SightFirst Eye Hospital, PO Box 66576-00800, Nairobi, Kenya. Tel: +254 20 418 32 39. Email: training@lionsloresho.org

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Free short online courses for eye care professionals to help them maintain skills and continue their professional development from Lions Aravind Institute of Community Ophthalmology (LAICO), India. Visit www.aurosiksha.org

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Next issue



The next issue of the *Community Eye Health Journal* will be called **Balancing the books**