

Schistosomiasis and soil-transmitted helminthiasis control in Cameroon and Côte d'Ivoire: implementing control on a limited budget

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SUMMARY

Schistosomiasis and soil-transmitted helminthiasis occur throughout the developing world and remain a major public health problem in the poorest communities with enormous consequences for development. The extent of the problem has long been neglected because these diseases rarely kill at a young age and also because of their insidious nature. Today there exists a momentum and an unprecedented opportunity for a cost-effective control of these neglected tropical diseases. The control of these diseases has become a priority on the agenda of many governments, donors and international agencies. This paper highlights the progress made and future control activities in Cameroon and Côte d'Ivoire, where schistosomiasis and soil-transmitted helminthiasis control measures have been implemented over the past decade with limited budgets. In Cameroon, deworming activities were increased to encompass all ten regions in 2007 as a result of a co-ordinated effort of the Ministry of Health and the Ministry of Education with national and international partners. In Côte d'Ivoire, focal control activities were achieved with support from various partners. Prospects, opportunities and challenges for the control of neglected tropical diseases in these two countries are discussed.

Key words: Schistosomiasis, soil-transmitted helminthiasis, control, deworming, neglected tropical diseases, Cameroon, Côte d'Ivoire.

INTRODUCTION

Schistosomiasis is one of the most prevalent parasitic diseases in the world. The disease has major health and socio-economic repercussions and it constitutes an important public health problem in developing countries. Schistosomiasis is endemic in 76 countries, where 779 million people are at risk of infection; it is estimated that 207 million people are infected. The disease affects the poorest of the poor and compromises their development (WHO, 2002; Steinmann *et al.* 2006). Despite the existence of tools in the 1970s and 1980s, control was sustained for a prolonged period only in few countries and almost no progress was made in sub-Saharan African countries, the most affected part of the world. In the 1990s, interest in schistosomiasis control in Africa waned.

Therefore, as with other neglected tropical diseases (NTDs), schistosomiasis control has been overshadowed by other health priorities. The highest priority of the international health community was given to the 'big three', i.e. HIV/AIDS, tuberculosis and malaria, with less attention to other infections related to poverty (Molyneux, Hotez and Fenwick, 2005).

Recent years have witnessed an increased interest in the control of NTDs, and today there exists a global momentum for the control of these diseases, as well as an unprecedented opportunity for cost-effective action. The control of NTDs has become a priority on the agenda of many governments, donors and international agencies. The World Health Organization (WHO) has played a major role in this prospect. Indeed, under the aegis of WHO, all member states of WHO (over 200 countries) have endorsed in May 2001 the World Health Assembly resolution WHA 54.19, with as a major objective the regular treatment of at least 75% of all school-aged children at risk of morbidity by 2010. This commitment has led to a series of events and initiatives

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in favour of the control of worms, in particular the launching of the 'Partners for Parasite Control' (PPC; <http://www.who.int/wormcontrol/en>) and the 'Schistosomiasis Control Initiative' (SCI; <http://www.sci-ntds.org>). The renewed impetus for schistosomiasis control in several countries of sub-Saharan Africa has generated a greater political commitment. Within the past five years, seven African countries officially launched their national control programmes for schistosomiasis and soil-transmitted helminthiasis (STH); i.e. Uganda, Cameroon, Burkina Faso, Niger, Mali, Zambia and Tanzania (Southgate *et al.* 2005).

From these seven countries, Cameroon is the only one where the programme was launched and is being implemented without major external support. In parallel, there has been considerable commitment to the control of schistosomiasis in other countries in Africa. Several countries have developed or revised their national plans. In this article, a review of activities in Cameroon and Côte d'Ivoire is made to assess control progress in these two non SCI-supported countries.

CONTROL OF SCHISTOSOMIASIS AND STH IN CAMEROON

Background

In Cameroon, schistosomiasis and STH are important parasitic diseases. Recent estimates indicate that at least 2 million people are infected with schistosomiasis, 5 million are at risk and more than 10 million are infected with gastrointestinal helminths (Tchuem Tchuente *et al.* 2003).

In 1983, a pilot project for schistosomiasis control, funded by the United States Agency for International Development (USAID), was set up. Within this framework a national epidemiological survey of schistosomiasis and STH was conducted between 1985 and 1987. Overall, 49 divisions, 504 schools and 23 850 schoolchildren were investigated. The results showed the occurrence of *Schistosoma haematobium*, *S. mansoni*, *Ascaris lumbricoides*, *Trichuris trichiura* and *Necator americanus* as the major helminth species. The highest transmission levels of schistosomiasis occurred in the northern part, whereas STH were more prevalent in the southern part of the country (Ratard *et al.* 1990, 1991; Brooker, Donnelly and Guyatt, 2000). When considering all these helminthic diseases, no region of the country is spared. However, this pilot project stopped in 1989 when the USAID support ended.

Taking advantage of the renewed momentum, the national programme for the control of schistosomiasis and STH was created in March 2003. There is a strong political commitment from the Ministries of Public Health and Basic Education. These two ministries work in close collaboration and this

inter-sectorial engagement is consolidated by the fact that the national steering committee for the control is co-chaired by the Minister of Public Health and the Minister of Basic Education, as president and vice-president, respectively.

The Cameroonian proposal for support to SCI was presented by the Minister of Public Health himself who attended the SCI advocacy meeting in London in July 2003. Therefore, the non-selection of Cameroon for SCI support came both as a surprise and a disappointment. Beyond the main ranking criteria, including the existence of a strategic plan for control, the strong political commitment and the quality of the proposal, the SCI selection was finally made on a regional combination of three East African countries and three West African countries, with emphasis on country-regional collaboration and consortium.

In spite of this, the Cameroonian government made necessary efforts to ensure the success of the schistosomiasis and STH control, as it was among the priority programmes of the country. Hence, the national control programme was officially launched on 25 March 2004.

The action of the programme during the past few years was intense and multifaceted, with a number of key achievements. Based on the limited resources available, the priority activities were centred on three major activities: (1) the production of various strategic documents necessary for the implementation of the activities and advocacy; (2) the advocacy and the mobilisation of partners and funding; and (3) the implementation of activities in selected areas.

A strong emphasis was put on advocacy, the results of which were encouraging for future activities and plans. The most important was the selection of Cameroon as the first start-up country for mebendazole donation in Africa, a recent initiative launched by the pharmaceutical company Johnson & Johnson (http://www.janssenpharmaceutica.be/download_Cameroon_N.asp).

With regard to control, a pilot phase was completed in February 2006 in one health district, where approximately 20 000 school-aged children were treated with praziquantel and albendazole. Subsequently, the activities were extended to one entire region of the ten regions in Cameroon, the Adamawa region in the northern part of the country. This was implemented with support from partners, including the World Food Programme (WFP), the Canadian Co-operation, the United Nations International Children's Emergency Fund (UNICEF) and SCI/Medpharm (which donated the drugs praziquantel and albendazole). Deworming was conducted in all 500 primary schools in this region, and approximately 150 000 school-aged children were treated in May 2006. Overall, 700 head teachers, 500 representatives of parent teacher associations, and 2500 teachers were trained. In addition, parasitological surveys

were conducted in 40 selected schools where stool and urine samples were collected from a total of 1830 children and examined for schistosomiasis and STH.

Partnership and scaling-up activities

In 2005, Johnson & Johnson established a partnership with the Task Force for Child Survival and Development to develop a programme to donate mebendazole via a multi-disciplinary initiative designed to address intestinal worm infections in the most at-risk children of the world. Cameroon was selected as the start-up country of this drug donation programme because of its leadership and commitment to eliminating infections as a major public health problem (http://www.janssenpharmaceutica.be/download_Cameroon_N.asp). This support enabled the national control programme to scale-up activities rapidly. As a result, deworming activities were increased to encompass all ten regions. In 2007, Cameroon launched a nationwide deworming campaign, and 4 million school-aged children were treated. The launching ceremony allowed the government and partners to further reaffirm their commitment and to galvanise communities, international development agencies, non-governmental organisations (NGOs) and other stakeholders to join in the effort to implement fundamental improvements in disease control and prevention.

The country has in place school-based and community-directed channels and in the programme teachers and community drug distributors administer the drugs to children along with health and hygiene education. The major activities conducted are: (1) training of health and education personnel, (2) sensitization and education of communities about the disease, the risks of infection and measures for prevention, (3) promotion of hygiene, safe water and sanitation systems in communities, and (4) deworming of children.

Furthermore, parasitological surveys were conducted in schools in selected health districts where stool and urine samples were collected from children, and examined for schistosomiasis and STH. Detailed analyses of the data are in progress and results will be published shortly.

The future action plan of the control programme is to deworm all school-aged children in endemic zones twice a year. To achieve this, further support and partnerships strong will be required to complete and boost the government effort. Indeed, the control of NTDs remains a formidable challenge.

CONTROL OF SCHISTOSOMIASIS IN CÔTE D'IVOIRE

Schistosomiasis has been reported in Côte d'Ivoire since the 1950s. In 1994, the Ministry of Health put

forward a resolution to extend the national control programme of onchocerciasis and human African trypanosomiasis to include schistosomiasis and lymphatic filariasis (LF) within the framework of the devolution of the West African Onchocerciasis Control Programme (OCP). In 1998, a national conference was held with the aim of launching a national schistosomiasis control programme. The first action identified was to update the map of the current distribution of schistosomiasis across the country. The mapping of urinary schistosomiasis was facilitated by the use of a previously validated school-based questionnaire (N'Goran *et al.* 1998). Subsequently, questionnaires were administered to 1337 primary schools in five administrative regions in the South and Centre of the country. More than 130 000 schoolchildren were interviewed. The frequency of reported 'blood in urine' was used as a proxy for *S. haematobium*, and the results were 31%, 20%, 15%, 13% and 9% in Agneby, Marahoué, Lacs, Moyen-Comoé and Sud-Comoé, respectively (N'Guessan *et al.* 2007). In addition, parasitological surveys conducted in school-aged children between 1998 and 2005 revealed prevalences ranging between 5.5% and 38.6% for urinary schistosomiasis, and between 13.6% and 57.4% for intestinal schistosomiasis, with infections widespread throughout the country (E. K. N'Goran, unpublished data).

In parallel, a number of specific research questions were pursued; among others, the first randomized controlled trials with oral artemether for prevention of patent infections with either *S. mansoni* (Utzinger *et al.* 2000a) or *S. haematobium* (N'Goran *et al.* 2003), and the efficacy of praziquantel and reinfection patterns in schoolchildren (N'Goran *et al.* 2001). In 2006, a clinical trial to assess the efficacy of tribendimidine and albendazole against hookworm infections showed that a single oral dose of tribendimidine (400 mg) was as efficacious as a single oral dose of albendazole (400 mg) and without any serious adverse events. The results of this study will be published shortly.

After the first national conference in 1998, a national schistosomiasis control programme was drafted, identifying risk mapping as a first priority area. However, the programme never really started due to insufficient financial support and other constraints. Specifically, towards the end of 1999, a major socio-political crisis emerged, culminating in a civil war in September 2002. Despite these unfavorable contextual factors, major research and focal control activities targeting schistosomiasis and STH were pursued by the Université de Cocody-Abidjan with the support of partners, particularly the Centre Suisse de Recherches Scientifiques, the Swiss Tropical Institute and the Swiss Agency for Development and Cooperation (SDC).

The 2001 WHA 54.19 resolution was endorsed by health authorities of Côte d'Ivoire and, within this

control framework, various initiatives targeting mainly school-aged children were conducted at different scales in endemic areas. Control strategies and activities not only included chemotherapy-based morbidity control but also capacity building of school teachers and community health workers.

In 2001, pilot schistosomiasis control activities with a partial cost-recovery model were implemented in primary schools in three districts, namely Tiassalé, Man and Adzopé. A unit treatment cost (200 FCFA; ~US\$ 0.4) was fixed, based on extensive discussions with schoolteachers and other community key informants. A proportion of this was dedicated to the school for hygienic products (25 FCFA), another part (50 FCFA) was used to cover the distribution cost, and finally 125 FCFA were used for drug recovering. A total of 8746 children were treated.

Regrettably, due to the emergence of the civil war in September 2002, these activities were interrupted. With a support from SDC in October 2003, a systematic deworming campaign was undertaken to treat school-aged children in the semi-mountainous region of Man, western Côte d'Ivoire, hyperendemic for *S. mansoni* (Utzingler *et al.* 2000b; Raso *et al.* 2005). A total of 352 primary school teachers were trained for deworming and awareness raising; 349 schools were provided with health education materials and the standardized praziquantel dose-pole. A total of 130 000 children were treated with albendazole or mebendazole and 40 000 children were given both praziquantel and albendazole or mebendazole. The unit cost of the treatment was estimated at 165 FCFA per child.

Côte d'Ivoire is one of the ten countries participating in the Global Parasitological Control Initiative (GPCI) with the West African Centre for International Parasites Control (WACIPAC) also known as Hashimoto Initiative. However, to date, Côte d'Ivoire has not received any financial support from this control initiative for treatment of schistosomiasis. Côte d'Ivoire's national school health programme (PNSSU) with support from WHO, UNICEF, WFP implemented some schistosomiasis and STH control projects in selected districts. The project distributes deworming tablets and micronutrients. The first phase of the project began in 2005.

With the renewed interest in the control of NTDs, the government of Côte d'Ivoire and the Ministry of Public Health and Hygiene passed a referendum on 21 June 2007 (N°159 msHP/CAB) to officially establish the national schistosomiasis, STH and LF control programme (PNL-SGF).

PROSPECTS AND OPPORTUNITIES: INTEGRATED CONTROL OF NTDs

In the developing world, polyparasitism is the norm rather than the exception (Molyneux *et al.* 2005;

Fleming *et al.* 2006). In large parts of Africa, most children are infected by more than one species of helminth. These NTDs frequently overlap geographically and they impose a great burden on poor populations affecting the same individuals.

Today, robust, low-cost and effective public health interventions are available to relieve the burden of parasitic infection and to provide a better quality of life for people in poor settings. The current strategy for control is to integrate interventions for multiple diseases (Molyneux *et al.* 2005). This integrated approach is the basis for cost-effectiveness and streamlined efficiency. According to WHO, the greatest challenge is to extend regular anthelmintic drug coverage as a public health intervention to reach all individuals at risk of the morbidity caused by helminthic infections. 'Preventive chemotherapy' should therefore begin early in life, and every opportunity should be taken to reach at-risk populations (WHO, 2006).

Addressing the NTDs in a more integrated and holistic way has led to a greater recognition of the importance of these infections as causes of poverty and impediments to the well-being of people in developing countries. During the last decade the increased advocacy for NTD control has generated commitment and funding opportunities from several donors. However, the recommendations have yet to be put into effect and the opportunities are largely ignored. These infections are still ignored by policy-makers and politicians who over-focus on unachievable objectives and targets around the 'big three' diseases of HIV/AIDS, tuberculosis and malaria (Molyneux, 2008).

Integrated control strategies of NTDs in Cameroon

The four major NTDs targeted by WHO through preventive chemotherapy occur in Cameroon, i.e. schistosomiasis, STH, onchocerciasis and LF. These diseases have major health and socio-economic repercussions and constitute an important public health problem in the country. Schistosomiasis occurs mainly in the three northern regions whereas STH are widely distributed all over the country. Onchocerciasis occurs in parts of all ten regions of Cameroon, and it is estimated that 5 million persons are infected. Loiasis is endemic in seven regions and co-endemicity of loiasis and onchocerciasis is found in 85% of health districts where community-directed treatment with ivermectin (CDTI) is implemented, leading to some constraints for ivermectin mass administration (Boussinesq *et al.* 2003). With regard to LF, this disease is assumed to occur in many parts throughout the country but the current infection prevalence and distribution need to be assessed.

Considering the high prevalence and spread of these diseases and their geographical overlap,

Cameroon has developed a 2009–2013 strategic plan for integrated control of these helminthiasis. Indeed, it is estimated that at least three of these common NTDs are co-endemic in 96 of a total of 174 health districts.

Currently, there exists several specific health intervention programmes implemented in Cameroon by the Ministry of Public Health. Our strategy for an efficient and cost-effective integrated control of NTDs is centred on a piggyback approach. Therefore, the simplified strategy for the control of helminthiasis in Cameroon is based on a complementary co-administration of relevant drugs during three existing integrated national health campaigns.

First, co-administration of ivermectin and albendazole during the CDTI campaigns is implemented once per year allowing an integrated treatment of onchocerciasis, LF and STH.

Secondly, co-administration of mebendazole and praziquantel – where relevant – in school-based deworming campaigns, is implemented annually. This will allow treatment of STH and schistosomiasis. Importantly, the school-campaign should be conducted at 6-month interval from the CDTI campaign in order to address the bi-annual treatment requirement for STH.

Finally, distribution of albendazole or mebendazole to children aged 1–5 years during child health week campaigns is implemented twice a year at 6-monthly intervals and targets children up to 5 years. This will allow the deworming of all pre-school children not targeted by the two other campaigns.

Integrated control strategies of NTDs in Côte d'Ivoire

In Côte d'Ivoire, epidemiological studies conducted between 1998 and 2005 revealed STH prevalence between 4.1% and 39% in school-aged children (E. K. N'Goran, unpublished data); all are widespread and found throughout the country. LF is also widespread throughout the country. Though WHO provided funds to start LF mapping in 2000, mapping activities were stopped due to civil unrest in 2002. Out of the 72 districts within Côte d'Ivoire, 31 are known to be endemic for LF (prevalence measured by ICT cards above 1%). LF prevalence ranges from 0% to 44.4% (in the district of San Pedro of the Bas-Sassandra region). Eight districts were determined to be non-endemic and there are still 33 districts that require LF prevalence mapping. The country is also known as endemic for onchocerciasis. The PNL-SGF has developed a detailed 5-year integrated national control plan (2008–2012).

CHALLENGES

The control of NTDs is a long-term undertaking, which involves several challenges. The first challenge

will be to mobilise the funds required for successful actions. Therefore, as in almost all developing countries, Cameroon and Côte d'Ivoire will have to take advantage of the opportunities resulting from the growing global financial resources generated by the new partnerships and impetus for NTD control. These changes in the international agenda and the increase of funding opportunities should provide leverage for the control of NTDs.

Among other challenges, the most important are the sustainability of control programmes, the strengthening of partnerships and institutional capacities, the implementation of operational research, monitoring and evaluation, and the co-ordination of activities (Tchuem Tchuente, 2006).

Sustainability

To roll back the NTDs, it is necessary to continue and maintain the implementations of control activities during very long period. The programme should be long-term, and financial and implementation plans should be made accordingly. This would avoid one of the major errors of the past where most of the programmes were supported by short-term external funds and stopped immediately when funds ceased. To ensure sustainability, countries should, from the beginning, envisage strategies to: (1) keep the momentum, interest and enthusiasm for the control of the diseases; (2) organise and finance in a sustained way the distribution of drugs to those who need them; (3) mobilize operational costs for drug distribution, health education materials, baseline data collection, monitoring and evaluation, etc.; (4) ensure the availability and affordability of the drugs at community level in endemic areas; (5) integrate programme activities within the existing health structures and networks; and (6) strengthen the health system and national capacity at all levels, especially in the peripheral and remote areas which manage the greater number of communities and infected persons.

One of the key questions is how to guarantee the continuation of control after the decline or interruption of external funds.

Strengthening of partnership

An efficient control requires multisector collaboration and multilateral funding. No single organization can hope to achieve this goal alone. School-aged children are the target group for schistosomiasis and STH, so the collaboration between the Ministry of Health and the Ministry of Education should be reinforced. The target group for the different filarial infections is the entire population and the control strategy is based on community-directed interventions, which requires ownership by the communities and strong partnership with NGOs. Overall,

partnership with other government departments and NGOs concerned with water supply, sanitation and development projects should be developed and reinforced.

Strengthening of institutional capacities

The integration of control activities within the health services is fundamental for the sustainability of the programme. However, most of the existing structures do not have the capacity to ensure the implementation of these activities, leading to programme failure. Therefore, the strengthening of the health system is a requirement for the long-term viability of the control programme. Furthermore, an efficient participation of schools and communities in the disease control requires a reinforcement of capacity of the school system and the community ownership.

Operational research

It is important to support operational research to fulfil gaps and improve the implementations of the control. For example, the understanding of some key issues, such as baseline epidemiology, morbidity assessment, drug efficacy testing and monitoring of drug resistance, is of vital importance.

Monitoring and evaluation

Regular monitoring and evaluation are necessary to ensure that programmes are efficiently implemented and that the beneficiaries gain the maximum benefit. This is particularly challenging given the diversity of tools and indicators. Substantial progress has been made towards the development of standardized tools for monitoring and evaluating NTD control programmes. WHO is currently developing guidelines based on the experience to date with integrated preventive chemotherapy interventions.

Co-ordination

The main challenge raised by the development of multiform partnership is to set up clear efficient co-ordination mechanisms in order to optimize the use of resources mobilised from various partners. In the context of multidisease integrated control, there is a need for setting up a strong national task-force or steering committee for the co-ordination of activities of the different programmes and stakeholders within the country. The Ministry of Health should play the central role in this co-ordination.

CONCLUSION

During the past several decades, many attempts have been made to control schistosomiasis, STH,

onchocerciasis and LF. Important advances have been made such as the development of praziquantel, ivermectin, albendazole and mebendazole, the current drugs of choice for these NTDs, which amplified treatment possibilities to the majority of people who need it. Although few control successes were achieved, the global objective is long way off and these diseases remain important public health problems in developing countries. Nevertheless, failures and experiences of the past allowed an improvement of control strategies and tools.

Today, there exists a new impetus to global helminth control and a series of favourable factors for implementing successful control programmes. These factors are: a clear vision, a strong political commitment, simple tools, financial support from several governments, the existence of several international initiatives and funding opportunities and strategies for cost-effective implementations. Successful control across sub-Saharan Africa calls for strengthening health systems and interventions, ensuring access to anthelmintic drugs in all health services, co-implementation and the co-ordinated use of the different anthelmintic drugs, promotion of access to safe water, adequate sanitation and health education and mobilization of resources to sustain control activities. The challenge also includes the sustainability, the integration and the long-term commitment for the control.

At present, we have a great opportunity to take the challenge and relieve poor communities from disease burdens that jeopardise their development. There are several and increasing funding opportunities for the control of NTDs. There is an urgent need for well co-ordinated and transparent use of multi-source funds to increase efficiency and to avoid duplication of efforts. We should act cautiously and anticipate to avoid past errors.

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