

COUNTDOWN

Calling time on Neglected Tropical Diseases



Case study: Implementing Alternative Strategies for Onchocerciasis Control and Elimination in Cameroon

Onchocerciasis (river blindness) is a vector-borne disease caused by the parasite Onchocerca volvulus. It manifests as troublesome itching, skin rash, visual impairment and irreversible blindness. It is common and widespread in Cameroon. Currently, the World Health Organization (WHO) recommends mass drug administration with ivermectin (a microfilaricidal drug that kills the immature form of the parasite found in the skin), to reduce symptoms and gradually decrease disease occurrence over time. The WHO recommends that annual mass drug administration for 15-17 years with high population coverage may impact on transmission. Mass drug administration has been conducted in the South West Province of Cameroon for 12 years in a strategy known as Community-Directed Treatment with ivermectin (CDTi), yet higher than expected prevalence and intensity of onchocerciasis persists.

COUNTDOWN is determining the effectiveness of a test-and-treat strategy for onchocerciasis control using WHO-endorsed macrofilaricidal treatment, doxycycline, as a potential alternative for ivermectin. COUNTDOWN is examining the risk factors associated with sub-optimal effectiveness of the current CDTi and capturing social and health economics data to assess the acceptability and feasibility of alternative strategies for onchocerciasis control and elimination.

Study Design and Findings

- 30 Communities in South West Cameroon, an estimated 3,500 study participants
- Doxycycline administered by community health workers and community drug distributors
- Vector control through larviciding to reduce black fly density to reduce transmission
- Training of community drug distributors on doxycycline distribution
- Training for clinical grading and classification of skin onchodermatitis



Doxycycline is Safe in Co-Endemic Areas

Test and treat with doxycycline implementation is currently underway in South West Cameroon, addressing a known policy need for complementary and alternative strategies to combat onchocerciasis in areas where the African eye worm *L. loa* is also found. This geographic overlap of *L. loa* and onchocerciasis poses several barriers to effective implementation of ivermectin, relating to community perceptions of this treatment, as well as logistic and operational barriers inherent in having to screen for *L. loa* and mobilise additional resources for the detection and management of rare, but serious, adverse events. Doxycycline has no effect on *L. loa*, removing these implementation barriers.

Test and treat with doxycycline addresses a second important policy need; acceleration towards elimination in areas where ivermectin has not achieved a break in transmission. Ivermectin treatments must be repeated at least annually, since this drug only kills parasites in the skin, but does not permanently impact on adult worms who easily survive treatment. Doxycycline differs from ivermectin as it kills both adult and juvenile worms, meaning this is a curative treatment. This has huge potential to shorten the number of rounds of community wide treatment needed from decades long implementation to just a few rounds of treatment.

“There were changes because the way my body was scratching me and the way I was feeling inner fever, I do not feel it again.”

Female adult

“...when you take mectizan it will cause you dizziness and your body will swell upon, and it will make you not to be active to do another thing then you will be force to sit at home. If you want to take mectizan do not have to eat. It brought a lot of confusion in the community and now the community prefer this one (doxycycline).”

Male adult

Five-week doxycycline delivery has been successfully implemented in all participating communities. There were no serious adverse events, and only minor side effects were reported. The treatment was well accepted, with 92.6% adherence in those who started treatment finishing the whole five-week course. The COUNTDOWN team continue to monitor the impact and efficacy of the treatment.

Doxycycline Plus River Larviciding for Onchocerciasis Control

Evidence from Uganda has shown that the implementation of vector control as a complementary alternative treatment strategy alongside continued drug treatment of the human population can hasten the interruption of transmission (Lakwo et al., 2013). Therefore, the COUNTDOWN research team are working in collaboration with local communities to effect blackfly control, and to give local people the skills, knowledge, and training needed to measure key river characteristics and detect blackfly breeding sites within their own communities. Volunteers have received training on the measurement and treatment of rivers in conjunction with the health system and community leaders in each study location. Training was provided on measuring the velocity of water within the rivers, measuring the width and depth of the rivers, determining the discharge rate at a given point, application of treatments to rivers, and safety techniques throughout. The dual implementation of both test and treat with doxycycline and focal vector suppression should act synergistically to enhance the impact of implementing doxycycline alone.

Ten weeks of community-based river larviciding has been successfully implemented in participating communities. Local blackfly biting rates fell dramatically, and there were no logistical, environmental or technical issues associated with the implementation. Additional measurements and samples are still being collected to allow the long-term impact to be captured and understood.



“When the chemical was applied in our water, for the first week, we did not see any mosquito. But the second, the number of mosquitoes was small. Where they used to be rampant, in a day, I had just about three bites from them.”

Community Member 1

“The rate of mosquitoes around the water has reduced. I am around the river on daily basis. If we compare it with another river which was not treated, we realised that there are lots of mosquitoes in Obe. But this in this our river, Carr which was treated, it has reduced. I think that if the same medicine continually used, it will completely wipe them away”

Community Member 4

Dermatology

Early onchocerciasis research concentrated on blindness which meant that there was comparatively less data available about the incidence, severity and geographic distribution of onchodermatitis, the associated skin conditions caused by onchocerciasis. Previous work has shown doxycycline is highly effective against onchocerciasis (Hoerauf et al., 2009, Turner et al., 2010, Wanji et al., 2009, Walker et al., 2015), and to monitor the combined effectiveness with vector control, the COUNTDOWN team have collected additional data on the presence of onchodermatitis as a priority. A training visit was arranged by the COUNTDOWN team for consultant dermatologist, and leading expert on onchocercal skin disease, Dr Michele Murdoch, to conduct a week-long intensive programme of classroom teaching and clinical training for nurses from endemic areas, to enable them to better recognise signs of onchodermatitis. During the taught component of the workshop, the team learnt about the morphology and terminology of skin lesions, the clinical classification of onchodermatitis, and other common skin complaints.

The collection of data on itching was explained and practiced through role play. In addition, there was opportunity for the team to practice form-filling for clinical signs using clinical slides of cases. During doxycycline distribution, the newly trained nurses were part of the survey team who assessed communities for onchocerciasis infection. As an additional benefit to collecting data on this neglected aspect of onchocerciasis, the increased knowledge and capability they gained will have a lasting impact on their capacity to correctly diagnose onchodermatitis in the future.

Advocacy at all levels

The COUNTDOWN Buea team, led by Prof Samuel Wanji, have hosted a series of participatory meetings between community and public health stakeholders to engage communities before piloting studies in the Meme Basin. The meetings, which were attended by community members, community leaders and traditional rulers, senior divisional officers and their representatives, national journalists, researchers, academia, health officials, policy makers and dignitaries, learned from presentations, the programme timelines and activities. During the meetings, along with presentations of the COUNTDOWN research, a photo walk was arranged to display the importance of onchocerciasis control and to display several scientific posters.

Due to this collaborative approach to onchocerciasis control and elimination, and his many years of experience combatting onchocerciasis in Southwest Cameroon, Prof Wanji is a member of Cameroon's National Onchocerciasis and Lymphatic Filariasis Elimination Committee, which met for the first time in January 2018. COUNTDOWN research evidence was presented to the Committee, and high-level support for the implementation of test and treat with doxycycline is growing.



COUNTDOWN also advocates for onchocerciasis control internationally and attended the NGDO co-ordination group for onchocerciasis, a two-day event to develop blueprint for onchocerciasis elimination with contributors from WHO, academia, NDGOs and members of the Mectizan donation programme. As a result of COUNTDOWN's contributions, COUNTDOWN researchers were invited to be a member of the core steering committee, and the technical document production committee. The involvement of key policy makers in these meetings is the beginning of the process of ensuring their engagement in the ongoing work in Cameroon, and the keeping open strong lines of communication and dialogue between COUNTDOWN and policy makers.

Impact

The World Health Organization (WHO) recommends either doxycycline or vector control as alternative strategies for onchocerciasis control in *L. loa* co-endemic areas (WHO 2015), yet implementation research on the scaled-up delivery of these interventions is lacking, both as singular approaches or in combination. This implementation study, which combines existing proven and endorsed control strategies in a novel way, bridges this gap, generating much needed evidence on how best to tackle onchocerciasis in areas where sustained CDTi has not had the desired impact. Without tackling onchocerciasis in such areas, elimination targets will not be met. Therefore, this evidence is highly relevant to policy makers and the international research community and is vital to accelerate progress towards meeting the targets set out in the London Declaration on Neglected Tropical Diseases.

It is widely accepted in the international research community that alternative strategies against onchocerciasis are urgently needed, but evidence on how and where best to implement them is lacking. This work also provides additional evidentiary support for the targeted use of doxycycline in areas where *L. loa* prevalence would normally preclude community wide approaches to combating disease. This work will improve the health and livelihoods of infected individuals living in the Meme river basin, who have been so far neglected by ivermectin-based approaches which are not feasible or acceptable in these areas.

Gender and Equity

All evidence collected during this research is age and gender disaggregated. This increases the usefulness of the findings and recommendations to national and international policy makers and aligns outputs with the sustainable development goals. Gender shapes equity, poverty and disease experience in multiple ways, yet to date there has not been adequate attention paid to gender equity in the neglected tropical disease effort, or the multiple impacts of neglected tropical diseases on women and girls and how this varies within and between contexts (Theobald *et al.* 2017).



Equitable neglected tropical disease control is central to COUNTDOWN research, and fundamental to achieving several sustainable development goals, including to end the epidemic of NTDs (target 3.3), but also more broadly to achieve universal health coverage (target 3.8), and universal access to safe water (target 6.1) and sanitation (target 6.2). This test and treat strategy sought to bring health services to the community through community sensitisation, mobilisation and capacity building of close to community providers, specifically community drug distributors and so has lessons to share for achieving universal health coverage.

The research advanced community drug distributors' role from a one-off distribution strategy to a 5-week, daily interactive process with those affected by onchocerciasis. This additional training, supervision and support of community drug distributors provided opportunities to build trust and strengthen relationships in communities and the health system.

Onchodermatitis is disfiguring and can lead to those affected being excluded from or being unable to fully participate in community and economic activities. It has a severe impact on both mental and physical health. This research is also investigating how affected individuals, particularly those living with disabilities are perceived and treated by other community members. By generating evidence on this neglected aspect of onchocerciasis, COUNTDOWN will advocate for the inclusion of onchodermatitis in regional and national policies and guidelines and ensure that those affected get treatment so they can be included and participate in ordinary day to day activities fully.

COUNTDOWN is leading the way in implementing the well-established clinical grading scale to monitor the impact of doxycycline treatment and providing a model through which onchodermatitis can be prioritised during such treatment programmes. If successful, this approach could be easily transferred to other endemic areas and be used to monitor new drug regimens that are currently being developed. The knowledge transfer and capacity building achieved in COUNTDOWN is another important step towards increasing the profile of skin NTDs and moving towards integrated management strategies.

Key Recommendations

- ✓ Doxycycline is a safe alternative for the treatment of onchocerciasis in *Loa loa* endemic areas and should be implemented in such areas to enable London Declaration goals to be met
- ✓ Assessment of endemic onchocercal skin disease should be included in national onchocerciasis surveillance and elimination strategies
- ✓ Involvement of local communities and health services in research and disease control, from study design, to sensitization, mobilization and implementation as well as drug delivery and vector control, should be encouraged at all levels to maximise impact and benefit of said research and increase sustainability by promoting community ownership
- ✓ Reducing black fly biting rates through vector control not only reduces the risk of contracting onchocerciasis, but also greatly reduces the irritation of black fly biting which will improve the health and wellbeing of affected communities

References and Further Reading



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