

THE BURDEN OF SKIN AND EYE DISEASE DUE TO ONCHOCERCIASIS IN AFRICA FOR 1990, 2015 AND 2025

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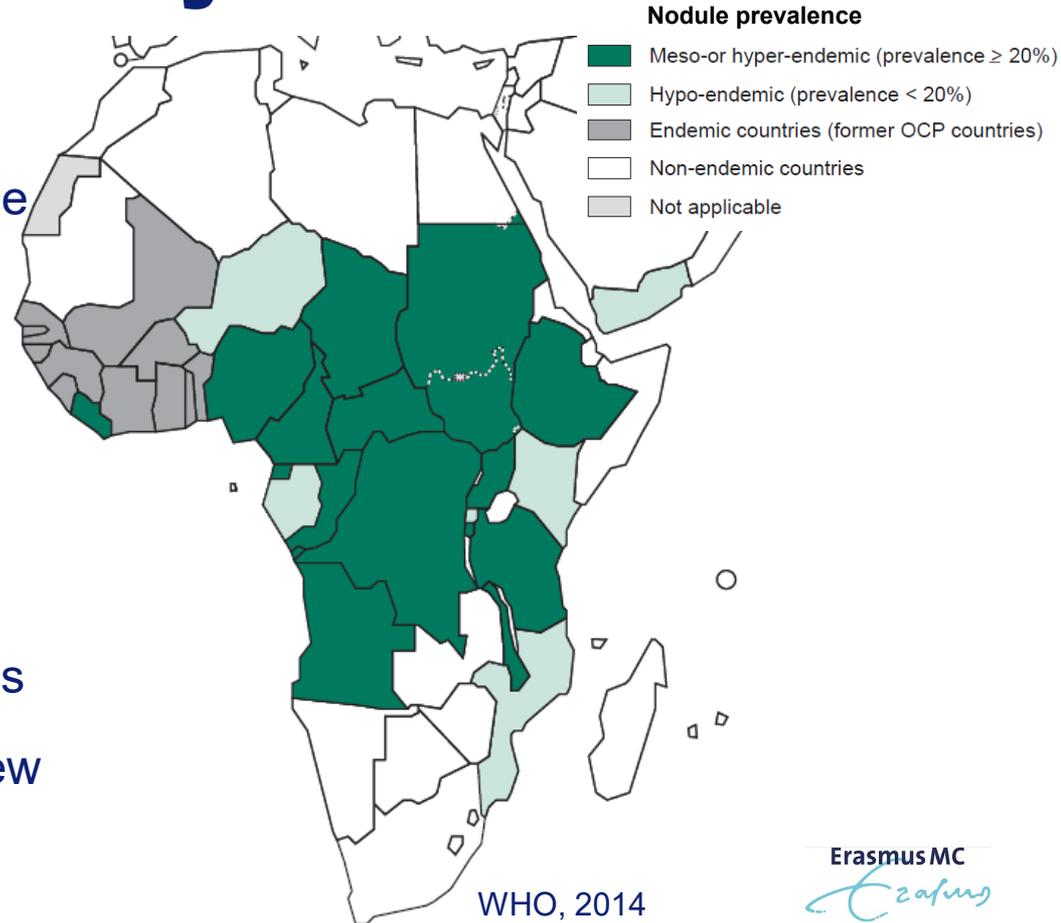
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Burden estimates: why?

- High disease prevalence in Africa
- Clinical manifestations create large burden
- MDA contributes to massive decline in burden, but not completely
- Quantify remaining burden to:
 - Evaluate impact of interventions
 - Understand requirements of new interventions (what and who)



Study aim

To estimate the burden of onchocerciasis in Africa* for 1990, 2015, 2025 in terms of:

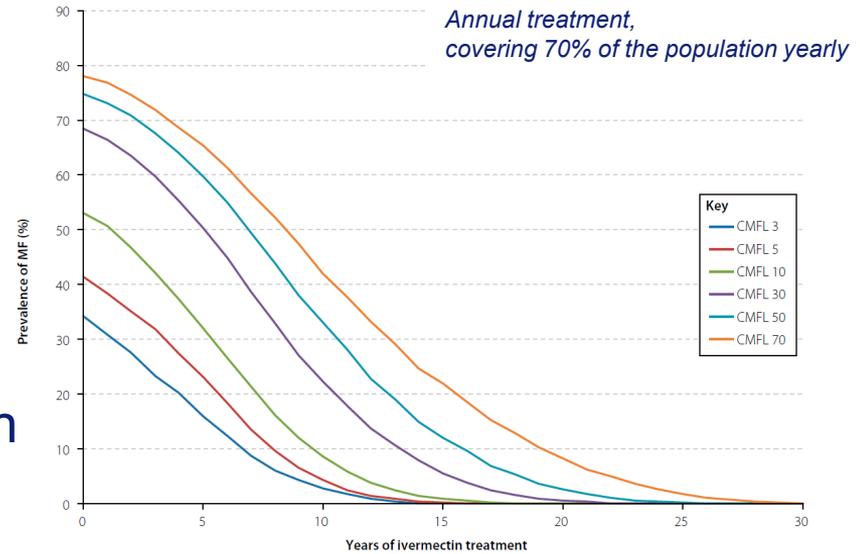
- Number of cases
- Disability-adjusted life years (DALYs) lost

* African Programme for Onchocerciasis Control (APOC) countries only

Method

Using computer simulation model
“ONCHOSIM”:

- Individual-based model
- Simulates onchocerciasis transmission in dynamic population, and impact of MDA over time
- New disease module: simultaneous prediction of clinical manifestations for each individual in the population



Tekle et al Infect Dis of Pov (2016) 5:66

Clinical manifestations

Reversible

- Palpable nodules



Reversible skin disease

- Severe itch
- Reactive skin disease



Irreversible skin disease

- Depigmentation
- Hanging groin
- Atrophy



Irreversible vision loss

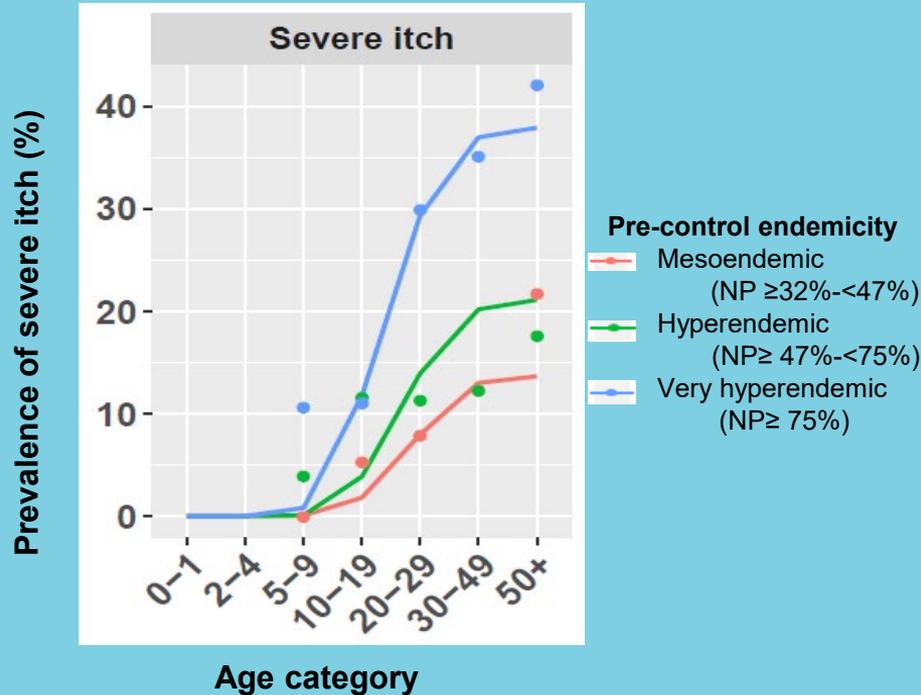
- Visual impairment
- Blindness



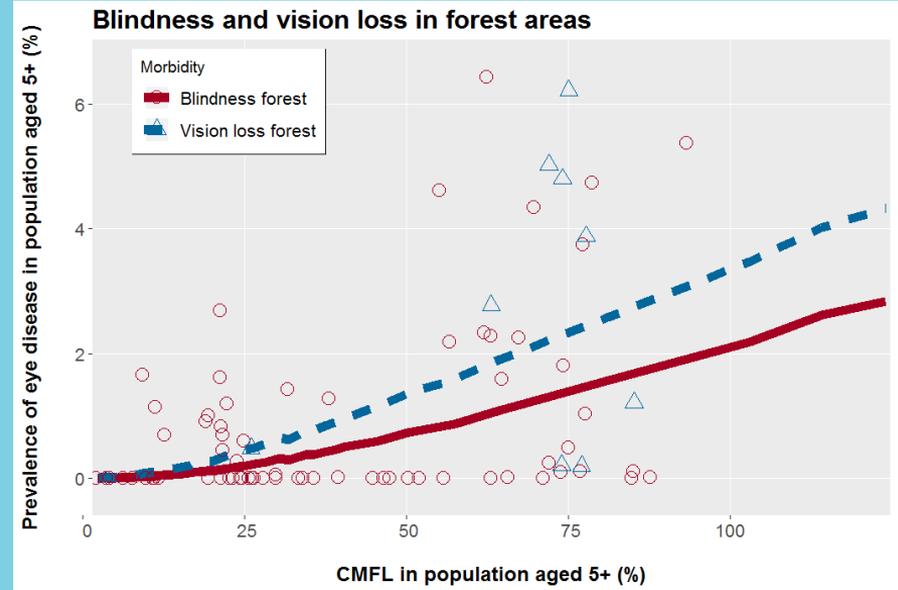
ONCHOSIM: quantifying new disease module

Model parameters are quantified for each manifestation, to reproduce:

Pre-control prevalence of morbidity by age and endemicity level, e.g.

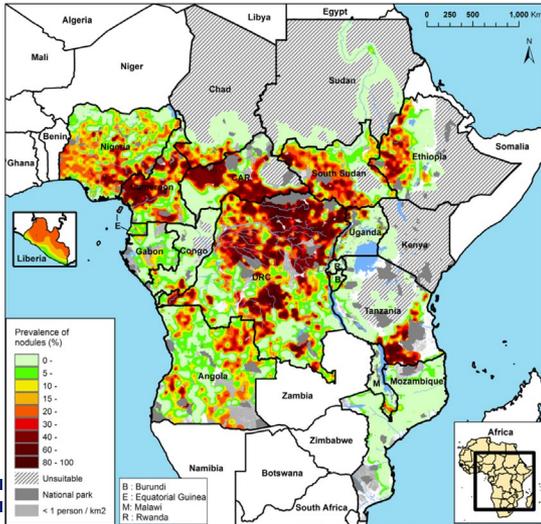


Pre-control association between endemicity and disease prevalence, e.g.



Simulate trends in morbidity prevalence for each APOC project

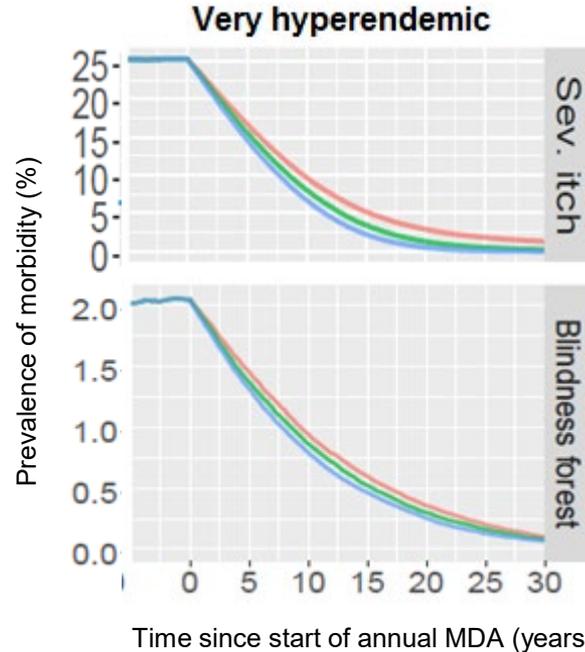
- Convert nodule prevalence into mf prevalence
- Distribution of population density over various endemicity levels
- Cases = Multiplication of predicted prevalence * population



Zouré et al (2014) *Parasites & Vectors* 7 (326)

MDA coverage

- 60%
- 70%
- 80%



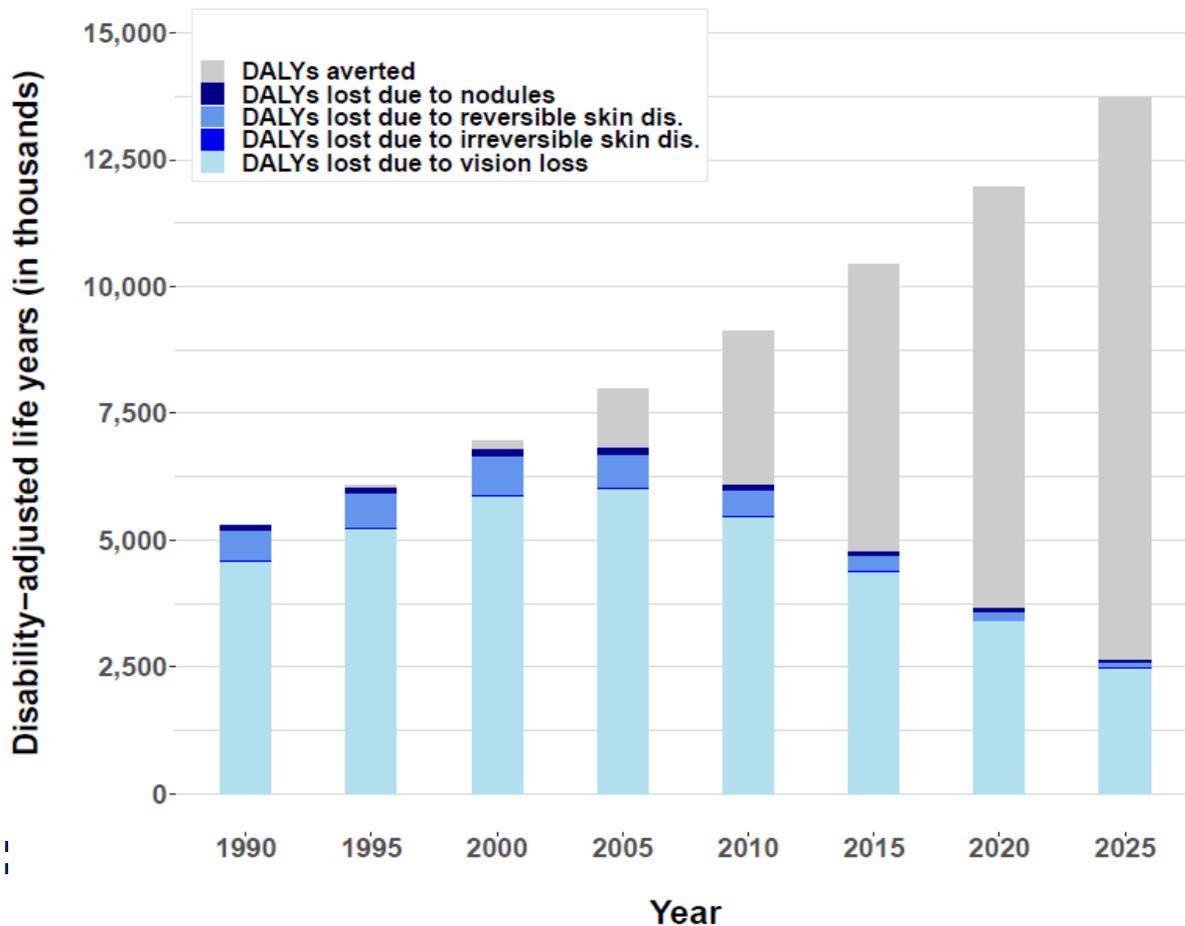
Stratification:

- APOC project
- Age
- Sex
- Bioclimate
- Endemicity

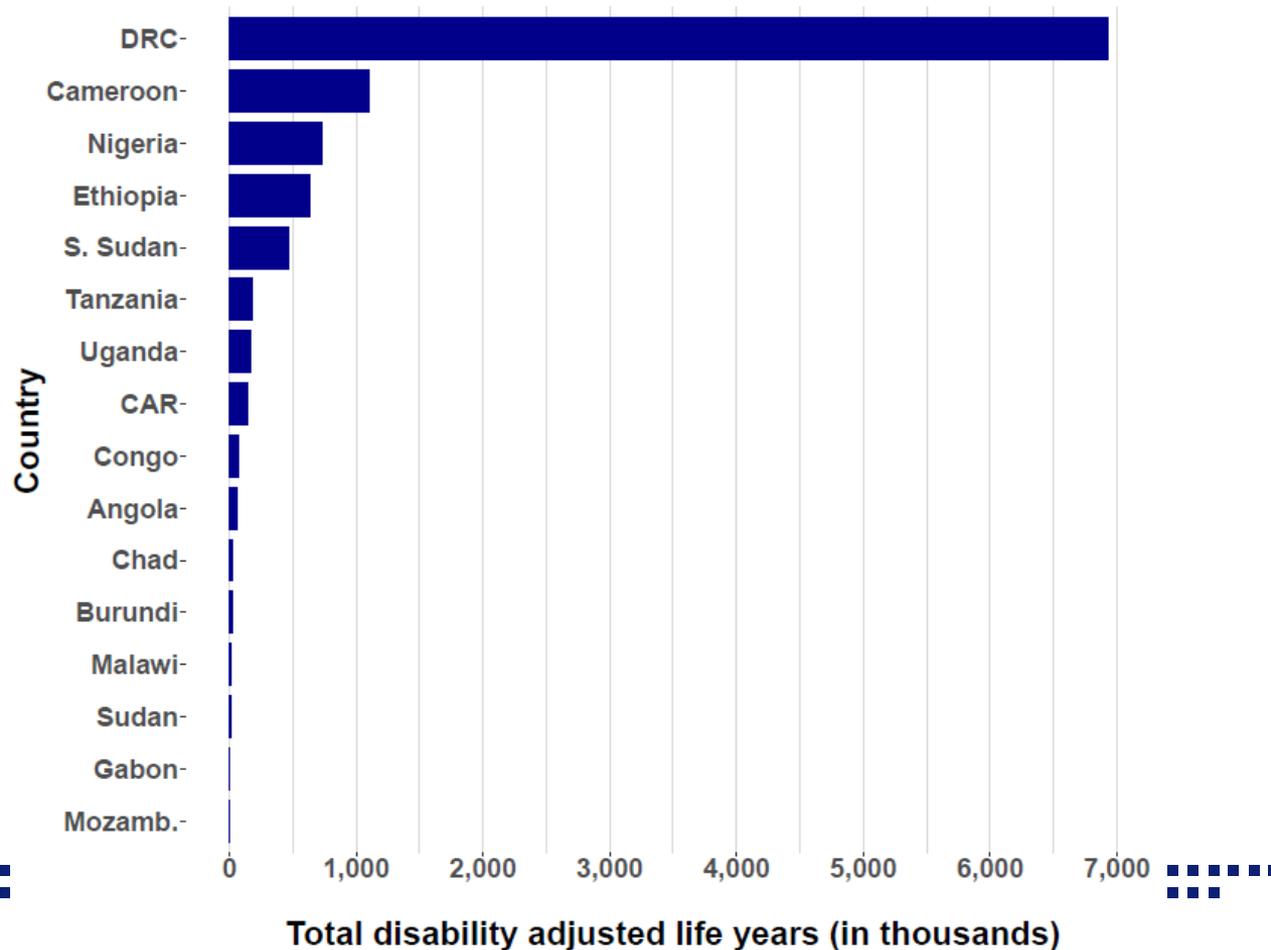
Number of infected and diseased cases (APOC countries)

	Number of individuals (x1000) (% of total population at risk)		
	1990	2015	2025
Total pop. at risk	77,550	152,794	200,412
Mf infected cases	21,770 (28.1%)	14,859 (9.7%)	6,464 (3.2%)
Worm infected cases	28,380 (36.6%)	28,748 (18.8%)	14,336 (7.2%)
Palpable nodules	7,080 (9.1%)	5,371 (3.5%)	1,799 (0.9%)
Rev. skin dis.	4,370 (5.6%)	895 (0.6%)	935 (0.5%)
Irrev. skin dis.	472 (0.6%)	593 (0.4%)	422 (0.2%)
Vision loss	1,919 (2.5%)	2,191 (1.4%)	1,573 (0.8%)
Rev. skin disease: severe itch and RSD Irrev. skin disease: any depigmentation, atrophy, and hanging groin Vision loss: visual impairment and blindness			

Total number of DALYs by year for APOC countries



Total DALYs lost per country for 2025



Conclusion

Case estimate:

- >4 million cases remaining with any clinical manifestation in 2025
- Most prevailing symptoms among all symptoms:
 - Nodules (45%)
 - Visual impairment (30%)



Burden estimate:

- Predicted total disease burden due to onchocerciasis in 2025: 2.6 million DALYs
- Main clinical manifestations contributing to burden:
 - Blindness (95%)
 - Severe itch (4.6%)

Major reduction in burden: ~11 million DALYs averted thanks to MDA and a decrease of 50% between 1990-2025

Implications

- Our DALY estimates (4.8 million DALYs) are considerably higher than GBD estimates (1.1 million DALYs) for 2015.
 - Wider spectrum of clinical manifestations taken into account.
 - Specific application of disability weights for each subtype of skin disease in DALY calculation.
- Still millions of persons infected (6.5 million) in 2025 that require treatment to prevent morbidity and to target disease elimination.
 - ~44% in hypoendemic areas
 - ~56% in DRC, ~17% in Nigeria
 - Need for alternative treatment strategies in *Loa*-endemic areas



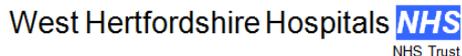
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